

Scarlatina.

Thesis submitted by  
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## S C A R L A T I N A

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(Scarlet Fever, German, scharlach; French, Scarlatina; Italian, Scarlattina; Spanish, escarlatina; Danish and Norwegian, skarlagensfeber; Dutch, scharlakenkoorts; Latin, febris rubra).

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### DEFINITION.

Scarlatina is an acute specific infectious disease, characterized by a vomiting, a more or less typical fever, sore-throat, and in from twelve to twenty-four hours by the development of a diffuse, punctiform scarlet rash, followed by desquamation, and frequently by the occurrence of nephritis.

## E T I O L O G Y

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### HISTORY AND GEOGRAPHICAL DISTRIBUTION.

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So far as the history of scarlet fever in very ancient times is concerned, the character of the eruption was not considered of sufficient importance to demand an exact description of it; hence there is no certain evidence of the prevalence of the disease at that time; nor do there seem to be unequivocal records of epidemics of scarlet fever before the sixteenth century. Ancient writers frequently described the disease as measles; and the two were as often as not, or more so, discussed together; so that until about the seventeenth century was not perhaps as distinct from measles. Again the faucial affection frequently occasioned it to be confused with angina maligna, or diphtheria; and the cutaneous lesion to its being mistaken for miliary fever. (Most - "Versuch einer Dritischen Bearbeitung der Geschichte des Scharlachfiebers," Leipzig, 1826; Hecker -- "Geschichte der neuen Heilk," Berlin, 1839, 200--274; Fuschs -- "Historische Untersuch. über Angina Maligna," Würzburg, 1828).

The origin of scarlet fever is, therefore, lost in antiquity, nor is the commencement of its epidemic prevalence in Europe at all certain. The first mention of its appearance in Great Britain was made in 1661 (Sibbald - "Scotia Illustrata," Edin, 1684, p.55), at Berlin in 1716 (Gohl - "Acta med. Berolin," December 1, 1716, vol. 1, p. 30, 11, p.4.), at Florence in 1717 (Calvi -



On Parolino's "Europae Medicina," Brix., 1747, p.33), and in Denmark in 1740 (Wernicke - "Spec. inang. de febris scarlatina," Hafn., 1760, p.23). The appearance of the disease in Asia and Africa cannot be determined; but it appears to have been first observed in North America about the year 1735; in South America in 1829 or 1831; and in Australia and Polynesia from 1847 - 48.

The oldest clinical description in connection with the name scarlatina or scarlet fever dates from Sicily, 1543 (Paulus Restifa-- "Epistol. med. ad Franciscum Bissum," Messina, 1589)); after which are the accounts of epidemics: at Breslau, by Doring (Sennert's "Epistol", Cent. 1, ep. 88, Opp. Lugh, 1676, VI, p. 620); at Wittenberg, in the year 1827, by Sennert (*ibid.*, Cent., 11. ep.20, l.c., p. 644); at Brieg, in 1642, by Winsler (*Ephem. nat. cur.*, "Dec. 1, Ann. 6 et 7, 1675 -- 76, Obs. 42.) Even in the beginning of the seventeenth century, Sennert (*loc. cit.*) refers to scarlatina as being only another form of measles, and Norton ("Pyretologia", Cap. V, Genev., 1696, p. 28), towards the end of the same century, in opposition to the generally accepted differentiation, maintained that both are nevertheless one and the same disease, differing only in the character of the Exanthem. It is not surprising, therefore, to find, the same opinion expressed occasionally by certain writers of the early part of the nineteenth century. It was, however, Sydenham (born 1624, died 1689), a contemporary of Morton, who established the specific nature of scarlet fever by means of observations made during the epidemics ("Opera Omnia"), which occurred in London 1661 to 1675, thereby laying the foundation of our positive knowledge of the disease, which observers since Sydenham's time have extended. It was not long in being recognized that the character of epidemics of scarlet fever were liable to great variation; a series of years during which the disease had been mild and benign were followed by others which manifested an unprecedented malignancy, and established the dangerous nature of the disease. Epidemics of scarlatina have exhibited this peculiarity up to latest times, Thus, in both England and Ireland, after an unusually mild appearance during opening years of the nineteenth century, the disease from the fourth decennium, suddenly began to assume not only much more dangerous forms, but also acquired quite a pandemicity. The annual mortality from scarlet fever in England and Wales from 1848 to 1855 comprised one-twenty-fifth, and in some years even one-twentieth of the entire death-rate.

Other States, however, appear to have suffered considerably from scarlet fever: Fehr. (Anchora

sacra," Jena, 1866, p. 90) mentions it at Schweinfurt in 1652; it was widespread in France (Jour. de méd., 1763, June, p 551.) in 1712; in Sweden (Rosenstein -- "Anweisung. gur Keuntn. und Kur. der Kinderkr.", Gött., 1768, 417); and in the Netherlands (de Haen -- "Thes. Sist. febr. divis," Vindob., 1760, p.25, and "Rattio med., " i, p. 96; Storch "Pract. und theoret Tractat. v. Scharlachfieber", Gotha, 1742).

The disease appears to more frequently be met with in Europe than elsewhere; and in Germany, France, the Netherlands, Scandanavia, Russia, and England, it is frequently the chief factor in the statistics of morbidity and mortality. Both the most northern and the most southern countries of Europe have enjoyed no real exemption from scarlet fever; thus Schleinsner ("Island undersögt, etc. ", p.53) Heps recorded it in Ireland,-- where it appears to have been prevalent in 1669, 1776, 1797 and in 1827, -- the Faroe Islands, and, in Italy (Menis-- "Saggio di topogr. stat.-med, della provincia di Bescia, etc.," Brescia, 1837, i. p. 154), Turkey (Oppenheim -- "Ueber den Zustand der Heilk. in der Turkei," Hamburg, 1833, p.54), Greece (Olympios -- "Bayr. med. corresp. 1840, 178), Sardinia (Moris - de Marmoras "Voyage en Sardaigne, etc," Paris, 1826), and the Ionian Islands and Malta (Zulati - "Giorn di med., " Venezia, 1764, ii, p. 224.)

In striking contrast to the wide diffusion of scarlatina in Europe, especially in the central and Northern parts, is that its infrequency in Africa and Asia. It is comparatively rare in the East, especially so, according to Pruner ("Krankh. des Orient," p. 120), in Egypt, where it occurs in a mild sporadic form. The same may be said for Abyssinia (Blanc -- Gaz. hebdom. de med., 1874, No.22. p. 349), Tunis. (Ferrini, loc cit. p. 154) Senegambia (Chassiniol - Arch de med. nav. May, 1865, p. 506; Ganthier -- Des Epidemics a an Sénégal, " Paris, 1885, p. 18), the Cape (Scherger-- Zeit. der Wiener Arzte, 1858, p. 156; Egan - Med. Times and Gaz., June, 1873, p. 682), and Hadagascar, (Borchgrevink -- Norsk Mag., Laegevidensk, 1872, p. 247); it appears, however, to be somewhat more common in Algiers (Claudot - Rec. de mem. de med. milit., 1877, p. 193), which it has sometimes assumed a very malignant character. Epidemics of scarlatina have been reported from the Azores (Norgueira - Jorn. de Soc. das Sci. med de Lisboa, xxi, 111); and it appears to have first made its appearance in Madeira (Gourlay - med. and Phys. Jour., May, 1811, p. 430) about the year 1806, whence it was absent from 1814 to 1824



(Heineken -- London Med. Reposit., July, 1824, p. 14.) and afterwards seen only in mild sporadic form (Kämpfer - Jamb. Zeit. f. die ges. Med., 1847, XXXIV. p. 166.)

According to Pruner (loc cit.) Asia Minor has been the only part of Asia to be visited by severe epidemics of scarlet fever. The disease has only been reported in rare sporadic cases in Syria (Tobler - "Zar med. Topogr. v. Jerusalem, Berlin, 1855, p.46, Robertson -- Edin. Med. and Surg. Jour., July, 1843, p. 57) Mesopotamia, Persia (Polak - Wiener med. Woch., 1855, No. 17), Arabia (Palgrave -- Union med., 1866, No. 20, p. 308) East Indies (Heyman - "Krankh in dem Tropenländern," Würzburg, 1855, p. 224), and India (Dawson - Phila. Med. Examiner, May, 1852). So far as British India is concerned some diversity of experience is encountered, thus, Chevers (Med. Times and Gaz., Jan. 1879, p.4) for Bengal, Rhude (Bibl. for Laeger, April, 1931, p. 263) for Tranquebar, Huillet (Arch. de méd. nav., Jan., 1868, p. 25). for Pondicherry, the Sanitary Commissioners for Madras (Rep., 1869), Collins (Indian Annals of Med. Sci., Nov. 1860, p. 5) for Deccan, Morehead ("Researches on Diseases in India) i., p. 360) for Bombay, and Evans (Edin. Med. Jour. August 1855) for Mirzapore, all declare that neither has any case of scarlet fever come under their notice, nor has any such case been proved to have occurred in India at all; while others, particularly Hogg (Med. Times and Gaz., Sept., 1876 p.253), and a few observers in Lower Bengal (Indian Med. Gaz., Oct., 1871, p.2) state that the disease has often been imported into India, but has never become epidemic there, having, in their experience, been always limited to a few mild cases among European or Eurasian children. The supposed isolated occurrence of scarlet fever in India may, however, have been due to the frequent mistaking of dengue for it: Milroy (Trans. Epidem. Soc., 1865, ii p. 156), in view of this, considers that the disease has undoubtedly, but to a mild degree, in Colombo.

Scarlet fever has been but seldom encountered about the coast towns of China (Armand - Gaz. med. de Paris, 1861, No. 17, p. 201; Rochefort - Arch de med. nav., April, p. 241; Dudgeon - Glasg.

med. Journ., July, 1877, p.328), though Morache (Ann. d'Hyg. Jan., 1870, p.55) states that he has often seen it epidemic in Pekin. According to Wernich (Deut. med. Woch., 1871, No. 9. p. 101), scarlet fever appears to have been quite unknown in Japan.

The disease seems to have first made its



appearance in Australia and Polynesia at the beginning of the year 1848, when it broke out simultaneously in Tahiti (Arch de med, nav., Oct. 1865, p. 203 ), New Zealand (Thomson - Brit. and Foreign Med. Chir. Rev., April, 1855) and Tasmania (Hall Trans. Epidem. Soc., 1865, ii. p. 72) but everywhere to a limited extent and in a mild form. It reappeared in Tasmania, in 1853, and in New Zealand in 1854, reaching Australia at the same time (Tuke - Edin. Med. Jour., Feb., 1864, p. 721).

The disease appears to have assumed malignant proportions at Melbourne in 1876, and, with the exception of Tahiti, the islands of Polynesia seem to have at this time escaped its ravages entirely

North America did not receive a visit from Scarlatina until the year 1735, when, according to Douglas (The Practical History of a New Epidemical Military Fever", Boston, 1736; New England Jour. of Med., Jan., 1825, p. 1.) and Colden ("London Med. Observ. and Enquiries., 1754, i., p. 211.) it made the first appearance in Kingston, Mass., spreading from thence to Boston and neighbourhood, later to New Hampshire, and, during the next few years, spread itself over the whole of the New England States, reaching New York and Philadelphia in 1746 (Morris - "Lectures on Scarlat Fever," Phila, 1851). From thence the disease spread along the Atlantic Coast to South Carolina, where it is mentioned by Chalmers (Account of the Weather and Disease of South Carolina, London, 1776), as being of a very rare occurrence. Scarlatine seems to have reappeared in the Northern States in 1784, and in 1791 - 93 it penetrated for the first time into the interior of the continent, particularly into Kentucky and Ohio (Drake - loc cit. ii., p. 599). Its presence at Canada was first noticed in 1843, at Toronto (Stratton - Edin. Med. and Surg. Jour. April, 1849, p. 269), from whence it became widespread as far as the Gulf Coast States. The disease seems to have been of much rarer occurrence in the Southern States than in the Northern. It occurred, however, in 1821 in Arkansas (Huntt - Amer. Med. Recorder, 1822, v, p. 277), in 1832, in Augusta (Robertson - Amer Jour. Med. Sci., Feb. 1834), , in 1843 in Alabama (Basset - Southern Med. Reports. 1850, i, p. 266; Babes - ibid., p. 313) in 1847 in New Orleans (Rhodes - ibid., p. 239) and in Raleigh, North Carolina in 1854 (McKee - Trans of the Carolina State Med. Assoc., 1856 ) From Sozinsky's epidemiological data of the disease based upon the results of the U.S.A. census of June 1870, we learn that while the yearly mortality was from 30 to 160 per 100,000 inhabitants in the New England States, New York, New Jersey, Pennsylvania, Maryland, Ohio, Virginia,

Indiana, Illinois, Michigan, Wisconsin, and Iowa, it fell to between 1 '0 and 9 '4 in Tennessee, North and South Carolina, Georgia, Alabama, Mississippi, Louisiana, Florida, Arkansas, and Texas. Up to this time, with the exception of a single case in 1848, Greenland had escaped the disease (Sundhedsscoll. Forhanal. for aaret 1848, p. 7; Lange-- Benaerkninger om Gronlands Sygdomsfahold, Kiobenh, 1864, p. 37, and only occasionally has it been observed in Newfoundland (Gras-- "Quelques mots sur Miquelon, Montpellier, 1867, p. 30, Anderson -- Dobell's Reports, 1870, i. p. 365 ), not, however, in Nova Scotia, New Brunswick and Hudson Bay Territory.

California in 1851 (Praslow - loc. cit. p. 55, Gibbons - "Annual Address delivered before the San Francisco State Med. Soc.", 1857, p. 10) seems to have been the first part of the Pacific Coast of North America where Scarlet fever put in an appearance: it occurred at the outset only in isolated cases and in a very mild form, but since then severe epidemics have been noted. Strecker (Hamb. Zeit. f. Med., 1847, vol. 34, p. 529), and Robredo (Periodico de la Acad. de Med., Sept., 1838) mention its occurrence in Mexico, whereas Heinemann (Virchows Archiv. 1873, vol. 58, p. 161) states that not a single case occurred during six years of ~~his residence~~ his residence at Vera Cruz. Central America seems to have been little troubled with the disease; according to Hamilton (Dublin Quarterly Jour. of Med. Sci., Aug., 1863) it is seldom seen in Honduras, whilst Schwalbe (Arch. f. klin., 1875, XV. p. 3). mentions a serious outbreak in Costa Rica in 1856.

The advent of scarlatina in the West Indies is not certain, the earliest mention of it being made of a mild epidemic in March, 1802 (Savaresy - de la fievre Jaune, "Naples, 1809, p. 23) the next account of it being given by Rufg of the 18 1835 epidemic (Arch de Med. nav., Aug., 1869, p. 136 ), According to Forström (Svenske Läk. Sallak. Handl., 1812, iv., p. 231), the disease appears to have been common enough in Gadeloupe, but not in St. Bartholomew, which remained exempt from it until 1829-30, when a severe epidemic occurred (Cock - Edin. Med. and Surg. Jour., Jan., 1832, p. 28), as also, later, at Curacao (Pop - Nederl. Tydsch. voor Geneesk., 1859, iii. p. 212. ) a case of scarlatina was, in 1845, imported into New Providence (Bahamas ) from America, where it appears to have been previously unknown (Duncombe - Lancet, March. 1846) Not until 1830, did the disease become widespread over South America. Brunel (Observ. med. etc., pp. 361.42.) mentions that it was once prevalent before in 1796 in the River

Plate districts; and, according to Sigaud (loc. cit. p. 208) it broke out anew in 1831 in Buena Ayres, from whence it spread to Monte Video, and in 1832, reached the Southern and central provinces of Brazil and ultimately Rio Janeiro. Since then in the Argentine Republic and Brazil (Mantegazza - "Lettre med. sulla America meridionale, Milano, 1856, i. p. 12) Duport -- "Observ. sur. la cote orientale d'Amerrque," Montpellier, 1868, p. 14; Rendu - Etudes topogr. et med. sur le Brésil", Paris, 1848, p.66) has frequently been visited by severe epidemics. About the time of its general diffusion over the eastern side of South America, the disease made its first appearance in Chili (Piderit -- Deut. Kling., 1855. No. 16., Giles -- "U.S., Naval Astronom. Exped. to the Southern Hemisphere," Washington, 1855, p. 247), where, in addition to Peru (Tschudi - Pest. med. Woch., 1840, pp. 470. 697; Smith - Edin. med. and Surg. Jour., April. 1840. p. 335), it has since then frequently encountered severe epidemics.



## B A C T E R I O L O G Y.

In spite of all the investigations into the exact nature of the poison of scarlet fever, - first begun by Hallier, in 1869, -- the specific cause still remains unknown. All likely seats - blood, urine, scales of desquamation, glands, sweat, etc.-- have been examined. but without being able to isolate from a patient any micro-organism possessed of the ability to reproduce the disease in others. The evidence is, nevertheless, strong that the disease does not originate of its own accord, that it does not arise from certain atmospheric or other similar conditions, but is produced by a specific bacillus; since countries have been free from it for centuries until it was imported by commerce.

In 1869, Hallier ("Der pflanzliche Organismus in Blute der Scharlachkranken"-- Jahr. f. kind-  
erh., N.F., ii., 1869 -- 89 ) discovered a micro-  
coccus, which he termed "tilletia scarlatina",  
either within the blood corpuscles or adhering to  
them. Later, in 1870, Hofman (Wiener med. Woch.,  
1888) discovered a micrococcus in the sweat; while  
in 1872, Coze and Felz ("Recherches cliniques et  
experimentales sur les maladies infectieuses",  
Paris, 1872) isolated a bacterium, 6 m.m. long,  
from the blood, the same proving fatal to rabbits.  
The same year Riess (Les Recherches microbieunes ~~das~~  
dans la scarlatine" -- Gaz. hebdomadaire, 13) found minute  
organisms in the blood, which, however, gave nega-  
tive results on inoculation or cultivation. In  
1875, Klebs (Corresp. f. Schweizer Aerzte, 1883,) isolated his so-called "monas scarlatinosum",  
from an original gland of a scarlet fever  
patient, consisting of a speher made up of microc-  
ci which developed into bacteria. Four years later  
Tscharner ("Ueber das Wesen des Scharlach - und  
Diphtheritis - Conlagiums, etc." - Central -  
Zeit f. kinderh. ii., 1878 - 1879) found micrococ-  
ci and bacteria in the blood corpuscles, scales  
of desquamation, and in the urine; as well as some  
spores, and a cryptogam which he termed "verticil-  
lium candelabrum (found also upon rotten wood),  
and considered to be a stage of development from  
the micrococcus. Tscharner went so far as to inoc-  
ulate himself with this, produced thereby a super-  
ficial inflammation, found cocci in his blood,  
concluding therefrom that he had produced scarla-  
tina in himself. In 1882 Eklund (Gaz. hebdomadaire, 13,  
1891) found what he termed "Scindens", cellular  
bodies, in the urine, the same being likewise  
discovered by Oosterlony ("On the Nature, Mode of Pro-  
pagation, and treatment of scarlatina"-- Amer. Jour.  
Med. Sci. LXXXIV, 1882) in the blood. The former  
reported his finding of the organism as well in

water, in the soil, on mouldy walls, on mouldy paper, and in innumerable masses whilst making microscopical Examinations of the Soil and water of muddy places, and of excavations dug for the purpose of laying water pipes. The same observer relates how scarlet fever immediately broke out among the children of a family living close to the place where the earth had been dug up in order to lay water-pipes and who could not help breathing the exhalation from the water evaporating from these excavations during the summer days. No inoculations or experiments, were, however, made by Eklund. The following year (1883) Roth (Gaz. hebd. 13, 1891.), by inoculating a hen with the desquamation scales of scarlatina, was able to produce an ulcerative inflammation of the eyelids. The same year, both Pohl-Pinkus ("Mikrokokken in den Epidermisschuppen von Scharlachkranken" -- Centralbl. f. die med. Wissenschaften, XXI, 1883) and Klamman ("Coccen an den Epidermisschuppen eines an bosartigen Scharlach leidenden knaben" -- Allg. med. Central-Zeitung, LIII, 1883) discovered, in the mouth and upon the inner surface of the Scales of desquamation, certain micrococci, and the former observer appears to have been the first to point out the advisability of disinfecting the ~~mouth~~ buccal cavity during an attack. In 1887, Finkelnburg (Gaz. hebd., 13, 1891) described the finding of micrococci, which seemed to be without etiological significance.

Jamieson ("Observations in a Method of Prophylaxis and an Investigation into the Nature of the Contagium of Scarlet Fever" -- B.M.J., i. 1887), after having thoroughly sterilized the skin, found in the scales of scarlatina patients, as well as in their blood, a great many lower forms of life: Sarcina lutea, streptococcus rubiginosus, micrococcus capsiformis, bacillus fulvus, the diplococcus scarlatinae, and the so-called "bacillus scarlatinae", which he regarded as pathognomonic, and found in the form of rods 0.4 mm. thick and 1.3--1.4 mm. long, usually united in long threads, but when cultivated upon bouillon or milk, soon formed a tough membrane. The bacillus was observed to be motile, to be capable of liquefying gelatine, and to produce a similar membrane there also. The bacillus, after the third day, was found in cultures from the blood with great regularity, and, after three weeks, in the scales of desquamation. Rabbits inoculated developed a temperature of 39.4° C., and Erythema followed by desquamation, and the bacillus was found in their blood. Except that the Erythema was more marked, the same results were obtained with guinea-pigs, while one calf inoculated



with the bacillus died in twelve hours, with severe lesions in the liver, kidneys, heart, and pleura, as well as intense congestion of the pharynx and tongue, and the other had a temperature of 40°C., and all the symptoms of scarlet fever, on the sixth day, including the exanthem and desquamation subsequently. That this discovery was not possessed of the etiologic significance claimed for it was demonstrated by W.R. Smith ("Note on the so-called bacillus of Drs. Jamieson and Edington" -- B.M.J., 1887), who obtained the same bacillus from the scales in dermatitis, and concluded therefrom that the so-called bacillus was merely the ordinary bacillus of sepsis; while others considered that the antiseptic precautions taken by Jamieson and Edington, in order to secure scales free from the contamination of air bacilli, were insufficient; and the Medico-Chirurgical Society of Edinburgh reported that out of the cases of scarlet fever examined the bacillus was found three times; of nine cases cultures from the blood were followed by results in four; and cultivations from the scales as well as inoculations in animals were negative.

Before this time, namely, in 1885, Klein ("Report on a Disease of Cows prevailing at a Farm from which Scarlatina had been distributed along with the milk of cows --" Rep. of Local Government Board, London, XV, 1885 -- 86) had investigated the epidemic of Scarlet fever prevailing in the Marylebone district of London, and attributed the source of infection to the milk-supply being derived from a dairy-farm at Hendon, where the cows were then suffering from a constitutional disease associated with enlargement of the udders, together with the development of vesicles upon them; which disease, from the result of experiments made with the streptococcus obtained from these vesicles, he regarded as being true bovine scarlatina. This opinion, however, has not been confirmed by subsequent observers. Thus, C.B. Brown ("Report on Eruptive Diseases of the Teats and Udders of cows in Relation to Scarlet Fever in Man" -- Privy Council Office, Department of Agriculture, London, 1888) proved that the so-called bovine Scarlatina of Klein, besides at Hendon, occurred at various other dairies from which Scarlatina was known not to have been spread ~~was~~ by the milk. Thin ("Contagium of Scarlet Fever; a Critical Review" --- B.M.J., ii, 1887) relates that the milkers at Hendon considered the disease in themselves and the cows to be cowpox, whereas Crookshank (Lancet, 1274, i, 1887; 1208, ii, 1887; 115, 122, 165, i, 1888), who observed the same epidemic among cows at Wiltshire, states that it was indeed cowpox, and that of the 300 consumers of the milk from the cows in question



not one had scarlet fever; both observers concluding, therefore, that the streptococcus scarlatina of Klein was nothing more or less than the ordinary streptococcus pyogenes. In spite of this, however, and the disavowments of other investigators, Klein states that whatever may be thought as to the nature of the streptococcus, he remains positive that scarlet fever arises from the same disease in the cow.

Mme. Marie Raskin "(Klinische Experimentale Untersuchungen über Secundarinfektion bei Scharlach"--Centralbl f. Bacter und Parasit V, 1889), in 1889 reported that she found among numerous lower forms of life, a peculiar micrococcus, at the onset of the disease, in the blood corpuscles: after death in the viscera, in the mouth, and on the skin; the same, however, whilst pathogenic in rabbits and guinea-pigs, did not produce true scarlet fever.

Fluessinger (Semaine Méd., July, 1893), in 1893, formulated his conclusions regarding the streptococcus of scarlatina, from which it appears that he considers it as pathognomonic. In the same year Dowson (Medical Chronicle, 1893--4, XIX, 217) and Lemoine (Bull. et Mém. Soc. des méd. des Hôp. des Paris, 1895, p. 1337) consider that the poison of scarlet fever is a micro-organismal product elaborated in the affected tonsils, which is moreover, very largely the point of entrance of the disease.

More recently Class ("Medicine," June, 1879; New York Med. Rec., Sept., 1899, p. 330; Jour. Amer. Med. Assoc. vol. XXXIV, No. 34, 1900, pp. 476--78; Ibid., vol. XXXIV, No. 13, 1900, pp. 799 et seq.) reports having examined 700 or 800 cultures taken from the throats of persons suffering from various forms of angina, and in a great number found a large diplococcus, which considering it as accidental contamination, he disregarded. Later, being interested in Scarlatina and taking particular notice of the micro-organisms growing in the throats of those affected, he observed the presence of this coccus in almost all cases. The organisms appeared to grow much better upon a special culture medium consisting of glycerine agar-agar containing about 5 per cent. of sterile garden soil. Upon this same medium he succeeded in growing the same coccus from the desquamated epithelium, throat secretions, and blood of scarlet fever patients; and having later (Jour. Amer. Med. Assoc., Feb. 1900) investigated 300 cases of scarlatina in which the presence of this coccus was demonstrated, he came to the conclusion that it is the specific organism.

Class's organism is a pleomorphic diplococcus,

resembling a very large gonococcus. It usually occurs in pairs, sometimes in tetrads, and in very old cultures enormous crescentic involution forms are observed. The coccus has neither capsule, spores, nor flagella, is non-motile; and multiplication seems to occur by division of a large diplococcus. It does not stain by Gram's method, but takes all others.

Class was able to cultivate his diplococcus upon glycerine-agar, to which 5 per cent. by weight of black garden earth was added, and rendered sterile by discontinuous heating. The earth is first thoroughly dried, then sifted through a very fine sieve until it is reduced to a fine powder, all particles of sand, etc., being removed; after which it is mixed with sufficient bouillon to form a thin paste, which is boiled for an hour, enough sterile bouillon being added from time to time to replace that evaporated by boiling. It is next set aside in a warm place to allow any spores it contains to develop; and is then boiled for an hour, after which it is again set aside, this process being repeated until no growth can be developed. After being added to the agar-agar the mixture is boiled for about 30 minutes, set aside for a time and again subsequently sterilized. On this medium scales from a scarlet fever patient, can be placed with a sterile platinum loop, and after from 24 hours to 7 days of incubation at 35°C., small whitish gray, transparent colonies appear along the line of inoculation and about the scales. These colonies are isolated at first, but subsequently coalesce. Their diameter varies, but is usually about one millimetre. The colony is glutinous. Class states that he was able to cultivate the organism from the desquamation scales of 74 cases of typical scarlatina, and from the blood of 16 cases; and that it was found in all cases of scarlatina sore-throat, but very seldom in healthy throats. He found it three times out of 23 examinations of supposed normal skins, but never in the blood of healthy persons. Inoculation produced no reaction resembling scarlatina in rabbits and guineapigs. When inoculated into swine, a decided reddening of the skin, most marked upon the abdomen, lasting for about 36 hours, and accompanied by marked increase of temperature was observed. Following the febrile reaction, some scaling took place upon the abdomen and ears. A pig was killed, and cultures taken from the kidneys, which were diseased, and showed the presence of the streptococcus. Page (Jour. Boston. Soc. Med. Sci., June 20, 1899), Grandwohl (Phil. Med. Jour. March 24, 1900) p. 688, and Jacques (Bull. North Western Univ. Med. School, March 31., 1900, p. 284) have to consider



extent confirmed Class's observations. Before ~~leaving~~ leaving the subject, however, it should be noted that Class states that the serum of convalescents retards the growth of these cocci, and that it is possible to prepare an antitoxic serum from laboratory animals. A pig weighing 25 pounds was given five injections of 1,2,3,4, and 5 c.c., respectively of bouillon filtrates between December 16, 1899, and February 6, 1900, the animal was bled on February 20, 1900, and the serum separated, tested on guinea-pigs and found to afford a slight protection

Curtois (Thèse de Paris, 1899) with others considers Scarlatina to be due to a streptococcus. He found organisms of that nature 42 times out of 97 examinations in the urine of patients; but they were found in albuminous urine more often than in non-albuminous, a fact which may point to the organisms as etiologic of scarlatinal nephritis. Curtois does not believe the streptococcus found in scarlatina to be identical with the streptococcus pyogenes.

Baginsky and Sommerfield (Berliner klin. Woch., No. 22, 1900, pp. 588 et seq.) mention the constant occurrence, in the pharynx and blood in scarlatina, of an organism, bearing a close resemblance to Class's diplococcus scarlatinae, of the nature of a streptococcus, which they consider as of possible etiologic significance.

Later, Baginsky (Semaine Med., 1902, p. 394) submitted 393 cases of scarlatina to special examination, and found streptococci present in all, and their relationship to the disease he considers as highly suggestive.

Monti (Arch. f. kinderheilk., 1902, Bd. XXXiii, H. 1 and 2) reports that smears taken by him from the pharynx in scarlatina showed streptococci in long and short chains, usually, however, in association with various other organisms, as staphylococci, yeasts, bacilli, sarcinae, pneumococci, etc., the streptococci being also found in the fluid obtained by lumbar puncture, and in pure culture, moreover in fatal cases. The serum, however, of convalescents did not agglutinate these organisms.

As casual agents, Mallory, (Jour. of Med. Research, Jan., 1904, p. 483) mentions certain protozoon-like bodies which he found in the epithelial cells of patients who had died of scarlatina.

It is obviously too early as yet to state positively that any of these organisms are the cause of scarlet fever. In view of the great infectivity and contagiousity of the disease the facts are decidedly against the streptococcus pyogenes being an etiologic element; and the constant presence of streptococci may be considered as due to the excellent pabulum afforded to their growth.



by the infected person, in whom they are doubtless responsible for many of the lesions observed.

#### MODE OF ORIGIN.

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The obvious conclusion that a patient has become infected with scarlet fever by another patient has at times been strongly objected to by many who believed in the sputaneous origin of the disease, and others, on the other hand, who maintained that - in cases where a connection cannot be traced between cases - scarlatina must have had its origin from animals, as we have seen was insisted upon by such observers as Klein. The evidence, however, hitherto adduced as to the non-human origin of scarlet fever cannot be taken as conclusive; and the same may be said also for its supposed miasmatic origin.

#### CLIMATE AND SEASON.--

The exact influence of climate upon the occurrence of scarlatina is not easy to determine so contradictory is the evidence obtainable. That it may play a prominent part in the geographical distribution of the disease has been suggested by the fact that the largest portions of Asia and Africa, especially their tropical and sub-tropical regions, appear to have almost entirely escaped scarlet fever. This theory, however, can easily be disproved by the fact that the disease has frequently been observed to prevail in the tropical parts of South America; whereas in certain cold and temperate latitudes it is amongst the rarest of diseases. The fact that certain countries appear to be exempt from scarlatina may be due to a peculiar insusceptibility on the part of the inhabitants not to any climate influence. In temperate zones the disease is undoubtedly much more often observed to be epidemic than elsewhere: rare occurrence in tropical and subtropical regions is a fact well known. The native races of India seldom suffer from an epidemic; if, is, moreover, practically unknown in Japan, and much less common in the Southern States<sup>of</sup> North America than in the Northern States; although the same does not apply to South America and European localities under similar climatic conditions.

The influence of season and weather has been frequently enquired into. Thus, Hirsch (Handbuch der historisch-geographischen Pathol., i, Stuttgart, 1881) has collected statistics of 435 epidemics in Norway, Sweden, Germany, Holland, Russia, England, France, Italy, Spain, and North America,

which may be stated in tabular form , thus;-

	Winter	Winter & Summer	Summer to Winter	Spring	Summer and Spring	Autumn to Spring	Summer & Autumn	Summer to Winter	Autumn to Summer	Autumn & Winter	Autumn to Spring	Total
Scandinavia & Russia	8	6	7	9	7	5	9	--	12	6	3	72
Germany, Holland, and England.	46	24	4	21	19	19	25	36	14	48	25	287
France, Italy, and Spain.	7	7	1	5	4	1	6	7	--	6	4	51
N. America	5	3	-	5	1	-	4	1	1	--	3	25
	66	40	5	38	33	27	40	53	15	66	38	435

These epidemics, therefore, occurred;-

178 times in winter  
 157 " spring  
 173 " summer  
 213 " autumn

or, otherwise expressed;-

29.5 per cent. occurred in autumn  
 24.7 " " winter  
 24 " " summer  
 21.8 " " spring

The maximum, therefore, falls in autumn and the minimum in spring, while the prevalence in winter and summer is about equal. For London and Sweden the mortality from scarlet fever substantiates these findings, and was;--

#### S E A S O N S

Years		Winter	Spring	Summer	Autumn
London	1833-1853	12,586	10.961	13.972	17.768
Sweden	1864-1873	2.869	2.569	2.777	3.415

The mortality can be arranged thus;-

	Spring per cent	Summer per cent	Autumn per cent	winter per cent
L O N D O N----	19.9	25.2	32.1	22.8
S W E D E N-----	22.1	23.9	29.4	24.6

Scarlet fever appears, therefore, to be, next to autumn ~~to be~~ most prevalent in summer and winter, least in spring.

Johannessen ("Die epidemische Verbreitung des Scharlachfiebers in Norwegen", Christiania, 1884) has classified 8608 deaths from scarlatina, in Norway, from 1867 to 1878, thus:-

24.1	per cent	occurred	during the autumn months --
			Sept. Oct., and Novr.
31.2	"	"	during the winter months--
			Decr. Janr. and Febr.
24.7	"	"	during the spring months---
			March, April and May.
19.8	"	"	during the summer months-
			June July August

An evident effect of season upon mortality was shown by the number of deaths during the single years of the period in question attaining its maximum during the winter and early spring months, and its minimum during the summer months.

In order to determine the month in which scarlet fever is most frequent, Johannessen analysed the statistics of 52 epidemics, and found; Autumn, 13 or 25 per cent; winter, 25, or 49 per cent; Summer, 6, or 12 per cent; and Spring, 7, or 14 per cent.

The same observer gives the following statistics for Sweden, 1867- 78, where there occurred 65.785 cases of scarlet fever;--

Month	Percentage of Cases		
January	...	...	11.3
February	...	...	9.2
March	...	...	9.1
April	...	...	7.8
May	...	...	7.8
June	...	...	6.9
July	...	...	6.6
August	...	...	5.3
September	...	...	5.7
October	...	...	8.0
November	...	...	10.4
December	...	...	10.7

From 1877 to 1883, in Berlin there were 5.428 deaths;-

Month	Deaths per cent.	
January	...	6.7
February	...	5.3
March	...	5.8
April	...	6.1
May	...	7.0
June	...	8.1
July	...	8.0
August	...	8.5
September	...	10.7



October	...	...	13.8
November	...	...	10.9
December	...	...	8.5

In both Sweden and Berlin, therefore, the cold months of the year have the greatest mortality, and the autumn the greater number of deaths; and, taking a general view of the question, it appears tolerably certain that autumn and winter are more prone to the disease than spring and summer, or, in other words, scarlet fever is less often observed from March to August than from September to February.

Johannessen has endeavoured to prove a certain connection between the temperature of the air and scarlet fever by a comparison of the two curves showing the distribution of the disease- per centage - according to months; whereas Magellsen ("Wetter und Krankheit", "Lufttemperatur und Scharlachfieber", Christiania, 1893, l. H.) believes that he has established between the two factors, regarding the mortality curve as a mirror of the temperature curve.

Some observers have sought for a cause of the prevalence of Scarlatina in such factors as the particular state of the weather, the wind, barometric pressure, and so forth. The idea that epidemics of the disease are apt to spread according to the direction of wind currents seems particularly erroneous, and in the same way that the local distribution of scarlatina is independent of climatic influences, so too is the appearance of the malady independent of season and weather.

#### NATURE OF THE SOIL.

No evidence is forthcoming to show that scarlet fever is to the slightest degree influenced by the foundations of the dwelling or conditions of the soil, as elevation, configuration, or physical or geological characteristics, for the disease has been observed to prevail as often in low-lying districts as in mountainous ones) in valleys as on tablelands and plains, on old and new formations, and on dry and wet ground.

#### THE FAROE ISLANDS EPIDEMIC AS BEARING ON ETIOLOGY-

Why scarlet fever does not attack every person exposed to it can hardly be explained. The well-known epidemic of the Faroe Islands from 1873 to 1875 has been specially studied in this respect; and it found victims there who had never suffered from it before: Amongst a population at all ages 38.3 per cent. suffered, as shown in the following table;-

# S C A R L A T I N A   I N   T H O R S H A V N

A G E	Total number of Inhabit- ants.	Total of those liv- ing in houses in- fected with scarlatina	Total num- ber of the latter at- tacked.	Percentage of total number of scarlatina patients
0- 1	17	12	8	66.6
1-5	74	65	44	67.1
5-15	184	155	99	63.9
15-20	68	56	42	75.0
20-40	299	171	40	23.4
40-60	193	105	3	2.9
Over 60	90	55	1	1.8

At this time the difference in susceptibility to measles and scarlet fever was apparent. Thus, in 1875 the population of Thorshaven was 930. when an epidemic of measles broke out, 418 being protected by a previous attack; still 506 took the disease. Hence, only 38 per cent. were prostrated by scarlet fever, and over 99 per cent by measles.

The scarlet fever epidemic was regarded as having originated in the Orkneys (Kirkwall). The first cases of it certainly appeared , in February 1873, in the island of Sudero, reaching Thorshaven in October, and spreading by April 1875 all over. The epidemic ended where it began, viz., at Sudero, reaching its acme of prevalence amongst the 24 islands at the seventeenth month from its commencement at Sudero. A general susceptibility to the disease was at no time apparent, even at Thorshavn. where the populace lived under conditions of crowding, and of contact with each other.

The irregularity of propagation of the disease is well illustrated by the epidemic of the Faroe Islands. Thus, at Haldersirg , there were 58 cases amongst 161 inhabitants (36 per cent.); at Eide, with 305 inhabitants, 6 cases (2 per cent.)

The nature of the transference of the poison could not be ascertained with such certainty in the epidemic as was possible in the case of measles, as the duration of the period of incubation was uncertain. The historian of the epidemic - Hoff - states that it was, as a rule, eight or nine days, reasoning from the following observations;-

1. On November 11th a peasant girl consulted a practitioner in Thorshavn, where a severe epidemic of scarlet fever was at the time prevailing. Her own

residence contained no evidence of the disease. She became ill on November 19th and two others of her household on the 27th and 28th respectively.

2. On the second of May a sailor, in whom the eruption appeared on this day, was admitted to the Thorshavn hospital. Nine days before he had been in Klakswig, where scarlatina was epidemic. Before and since he had been without intermission on the sea, and busy at his occupation as fisherman.

3. The one-year old daughter of an inhabitant of Kollefjord went to bed with scarlatina and diphtheritis. Her four-year old sister, who up to that time had lived in a distant healthy dwelling was brought home on June 15th, and at five o'clock in the morning was placed in bed by her sick sister. Hoff, who visited the house at seven o'clock - two hours later - had the children separated at once, and the well child kept, as far as possible from the sick one. Both, however, remained in the same house. On June 24th the four-year old child also broke out with the scarlet rash.

The transmission of the poison of scarlet fever undoubtedly occurred in the majority of cases by direct contagion, and usually during the stage of desquamation. The occurrence of infection in isolated cases was observed, even during the incubation period, three to six days after the infection transmitted the disease. Contagion also appears to have occurred repeatedly, in isolated cases, during the period of eruption.

The propagation of the disease by fomites, and by healthy persons was evidenced by the following facts:-

1. Articles of clothing were taken from a house in which there had been, three months before, two cases of scarlatina, to a house in a locality free from the infection, whereupon this locality became the seat of the disease.

2. Furniture from a house in which there had been scarlet fever was known to have carried the contagion.

3. An instance of the transference of the scarlatina poison through the medium of one or even two persons who themselves escaped infection seemed to cause the first appearance of the disease in Videro, one of the northern islands. The disease appeared in two houses on the ninth day after the medical attendant had passed the night in one, and was then consulted by a patient from the second dwelling. The patient himself, an adult, was not attacked, but the children in the house occupied by him received the infection.

4. A servant journeyed from an infected dwelling in Thorshavn on November 5th to his employer in Kollefjord, where the disease had not previously made its appearance. The journey, of several miles, was made in an open boat, in a pouring rain, and against



a strong headwind. The man came, therefore, in all probability in first contact with the children of his employer on the next day; yet the exanthem appeared on them nine days later, on November 15th.

5. A sailor left his home, which was infected by scarlatina, without having himself suffered from the infection. He then remained for more than three weeks at sea on board a fishing vessel. On his home journey he spent the night of March 28th in the locality of Nordskaale after he had put on his best clothing, which had up to that moment been kept, with the contagion probably clinging to them, in the ship chest. In the village, where previously no scarlatina had been known, there appeared on the 5th of April, and in the house in which the sailor had passed the night, an outbreak of the scarlatina eruption.

#### I M M U N I T Y.

As a rule one attack of scarlet fever protects the individual against another. Such acquired immunity is, however, by no means a certain one, as a second and even a third or fourth attack has been reported. One can only recognize a second attack as such when it appears some time after the disappearance of the symptoms of the first attack, and under circumstances which negative a distinct relationship.

Henoch ("Mittheil. über das Scharlach"--Charité Annalen, iii, 1876) states that he has only seen but one authentic case of a second attack of scarlet fever, and points out the frequency with which simple febrile erythemas are mistaken for the disease, and reported as second attacks.

According to Körner (Jahr. f. Kinderh., N.F., vol. IX. p. 362) when a second attack occurs it is nearly always from two to six years after the first, which most frequently occurs, in such cases, before the age of ten, the second outbreak being, moreover, no milder than the first, frequently much more severe.

According to some observers, the tendency to repeated attacks were a family peculiarity; thus Robinson (V -- H. Jahr., 1870, 11, p. 264) has recorded how four members of a family suffered from a second attack simultaneously. Trojanowsky (Dorp. med. Zeit., I., p. 297, 111, p. 199, IV, p. 19) was able to establish the fact that in two of his cases of secondary scarlet fever both parents had also had the disease twice, and in a third case, that at least the father had been affected twice. Murchison observed relapses in two sisters: sex, however, appears to be without influence in predisposing to a second attack. According to Gillespie (Jahr. f. Kinderh., 23, p. 1.) who alone makes the statement, second attacks are

more common among deaf-mutes than others.

Older girls and young women have been stated by some to be more liable to a second attack than ~~older~~ women, this being regarded as due to the accidental influence of an intense scarlatina contagion derived from the younger members of the family, Pommer (Wurt. Corresp., 1832, I, p. 27) has described how a patient (aged 49) was evidently infected from his son, a second time, who was suffering from a very severe attack. Rudimentary affections of older persons, during the course of scarlet fever in their children are reported as very common.

The interval between the first and second attack has, in a large number of cases been accurately determined thus, West (Pr. Vjschr., 39. p. 64) ascertained the interval to be in one case 36 days, which, though short, is almost too long to allow of its being considered a relapse in the ordinary sense. Landeutte (Naumann's Hebd., 111, p. 783) has reported the interval at two months; Wetzler (Med.-chir. Zeit., 1814, I, p. 126) at three; Salzmann (Wurt. Corresp., 1860, p. 77) at five; Trojanowsky (loc. cit.) at six; and nine; Billing at ten; Cohey (Schmidt's Jahr., 7. p. 275) and Webster (Jahr. f. kinderh., 16., p. 15) at eleven months; Wetzler (Med. chir. Zeit., 1814, I. p. 126) at one year; Trojanowsky (loc. cit.) at one and one-half years; Salgmaasn (loc. cit.) at two and two-thirds years; Thomson (Jahr. f. kinderh., 5. p. 310) at three years; Trojanowsky (loc. cit.) at three and a half years; Berton (Jahr. f. kinderh., 1, p. 381) at four years; Trojanowsky (loc. cit.) at five; Clemens (Schmidt's Jahrb., 86, p. 199) at six; Harlin, Trojanowsky (loc. cit.) and Horing (Wurt. Corresp., 844. p. 263) at seven; Murchison at ten; Lewin (Jahr. f. kinderh. 42. p. 66) at eleven; Clemens (loc. cit.) at fifteen; Heyfelder (Schmidt's Jahr., 8, p. 103) in his own person, at twenty-seven years.

Those cases in which a second attack occurs before the patient has quite recovered from the first may be considered as true relapses, and are analogous to the same occurring in typhoid fever. One may safely include in this category all those cases of a second attack which occur immediately after the first one, in addition to those in which the fresh affection begins not later than four or five weeks after the first. Such true cases of relapse have been reported by numerous writers, notably by Bartels (Virchow's Arch., 21. p. 69) Barthez and Rilliet (Schmidt's Jahr. 13 p. 129) Faye and Gaupp (Wurt. Corresp., 1854, XXIV. p. 13) Jenner (Jahr. f. kinderh. 55. p. 1.), Hillier (Ibid, 39, p. 385), Kjellberg (v.-H. Jahr., 1870, 11, p. 562), Lefevre (Jahr. f. kinderh., 5, p. 87, u. 176), Muller (Schmidt's Jahr., 2. p. 284), Hall and Peacock (Jahr. f. Kinderh.,



28. p. 403) , Richardson (Ibid., 22. p. 253), Robbelan (Cst. Jahr., 1861, IV. p. 204), Schwarz (Schmidt's Jahr. 19, p. 31), Smith (V - Jber, 1871, II, p. 250), Solbrig (Schmidt's Jahr., 29. p. 310), Steinbeck (Pr. Vjschr., 1. p. 113), Steinmetz and Steintal (Schmidt's Jahr. 1, Sppld. p. 288), Steibel (Jahr. f. Kinderh., 33. p. 145. u. 285), Trojanowsky (loc. cit.) and Wood (Schmidt's Jahr., 1, Suppl., p. 114). From the accounts given by these writers it appears that in the majority of cases the first and second attacks were developed with equal completeness; in some cases the second attack was more rudimentary; in a very few cases the first attack was not entirely characteristic. Some stated that the first attack was the severer of the two, others that the second attack was so; in several cases the greater intensity or mildness of the subsequent attack appears to have been determined by the contrary behaviour of the antecedent attack, so that both seem to have competed each other.

According to Richardson (loc. cit. ) the relapses among the crew of the war-ship Agamemnon occurred somewhat later than usual. Thus, out of about 700 men men, 300 were affected with scarlatina the first time, so that the ship had to be cleared, thoroughly disinfected and ventilated for more than one month. Five days after the return of the crew relapses occurred in 18 out of the 102 convalescents who had returned; but the disease also recurred in many of those who had remained on land in the hospital, as also in one who had gone home on holiday. In the majority of cases considerably more than one month had elapsed between the first and second attacks, the latter being much more intense than the former.

As a rule patients recover quite well from a relapse, especially should the relapse be of somewhat late occurrence.

A third or fourth attack of scarlet fever may be regarded as very rare occurrence. Richardson (loc. cit.) states that he himself suffered from the disease three times. Binz (Jahr. f. khkunde, 1871) mentions a patient who had scarlatina three times; and a similar case has been reported by Moore (Ibid. 2.p. 74) tells of a girl, aged sixteen, who, three years before, had suffered from severe scarlet fever at the same time as others of her family, and now had undergone another attack which was followed by dropsy; fourteen days after convalescence from the scarlatina, an affection of the throat set in, followed three days afterwards by a fresh, transient eruption; nine months after this she died from dropsy.



Stiebel (Jahr. f. Kinderh., 33. p. 145) has described the occurrences of a fourth attack of scarlet fever in a woman about 50 years of age, who in four successive years had as many attacks of complete scarlatina, the skin desquamating in parchment-like pieces 12 inches long. Jahn (Rust's Magaz., 28., p. 69) who recorded the very singular case of a woman, aged 42, who had scarlatina when six years old, and claimed to have experienced the same disease seven times. She stated, moreover, that the disease in no respect differed from scarlet fever, and in previous attacks had <sup>been</sup> diagnosed as such by well-known physicians; that besides the sore-throat, there was a characteristic cutaneous eruption, and after the twelfth day the skin came off first in scales, and afterwards in larger pieces. Jahn calls the condition "scarlatina habitualis," -- an instance of which, has also been recorded by Henrici during the Kiel epidemic of 1897--98, being that of a woman who at that time suffered from her seventeenth attack of scarlatina, with its classic symptoms.

#### I N F L U E N C E   O F   A G E .

There seems no doubt that age has a marked influence upon the predisposition of the individual to scarlatina. The tendency to the disease appears to increase from the sixth to the twelfth month of life, to be strongest from the second to the fifth or seventh year, and to rapidly diminish after the tenth year, so that adults, and especially the aged, have only a slight predisposition, the occurrence of the disease among the latter being very rare. Murchison's Statistics (Lancet, 1864 vol. 11. pp. 481-485) of 148,829 deaths from scarlatina in England in Wales in 1847, and from 1855 to 1861 illustrate the frequency of the disease at different ages.

	<u>Males</u>	<u>Females</u>	<u>Total</u>
Under 1 year.	5.575	4.424	9.999
From 1--2 years	10.817	10.158	20.975
2--3 "	12.324	11.518	23.842
3--4 "	11.400	11.128	22.528
4--5 "	9.051	8.675	17.726
5-10 "	19.219	19.372	38.591
10-15 "	4.023	4.653	8.676
Under 5 years	49.167	45.903	95.070
From 5--15 years	23.242	24.025	47.267
15-25 "	1.806	2.065	3.871
25-35 "	537	769	1.306
35-45 "	319	352	671
45-55 "	157	174	331
55-65 "	89	96	185
65-75 "	37	51	88
75-85 "	14	16	30
85-95 "	3	1	4
Over 95 "	2	4	6
Total	75.373	73.456	148.829.

According to these statistics, therefore, 63.87 per cent. of the deaths from scarlatina occurred under five years, 89.8 per cent under ten years, and 95.63 per cent. under fifteen years, but only 1.75 per cent. over twenty-five years. It has been asserted by some that the predisposition to scarlet fever is not stronger in childhood than in later years, and that adults only escape the disease because they have had it when young. However, if the mortality be taken at say 6 per cent. we find as Murchison has said, that the number of individuals attacked by scarlatina in England in Wales is considerably less than one-half the births, so that consequently a large number of people must remain exempt and attain middle life without being protected by a previous attack.

Johannessen ("Die Epidemische Verbreitung des Scharlachfiebers in Norwegen"--Academisches Preresschrift, S. 144, Christiania, 1884) has classified 1040 deaths from scarlet fever in Norway from 1862 to 1878 as follows;--

During the first year 1st month	0 cases
" " 2nd-3rd "	3 cases
" " 4th-6th "	12 cases
" " 7th-12th "	87 " 9.3 per cent.
During the second year	.. 43.0 per cent
" fourth & 5th year	.. 22.6 "
From fifth & 10th year	.. 20.5 "
" 11th -- 15th "	.. 2.3 per mille

The same author gives the following tabulation of deaths from scarlet fever from 1872 - 1878, arranged by ages and according to sex;--

# S C A R L A T I N A   I N   N O R W A Y

AGE	Male population	Number of Male Casualties.	Percent age of Male Casualties.	Female population	Number of Female Casualties	Percent age of Female Casualties	Total population of both sexes	Casualties in both sexes	Percent age mortality in both sexes
0-1 year	25.906	389	2.1	25.801	310	1.7	52.707	700	1.9
1-5 years	87.835	1892	3.2	85.634	1824	3.0	173.469	3806	3.1
5-10 "	102.267	820	1.1	99.490	667	1.0	201.757	1487	1.1
10-15 "	100.189	181	0.3	97.012	145	0.2	197.201	326	0.2
15-20 "	89.184	33	0.06	90.661	48	0.08	179.845	81	0.07
20-30 "	131.015	18	0.02	152.295	14	0.01	283.310	32	0.02
30-40	97.021	6	0.01	109.488	12	0.02	206.509	18	0.01

Of 1000 who died from the disease, the ages were, in years;

0--1; 1--2; 2--3; 3--4; 4--5; 5--16; 15--25; 25-45; 45-65  
 465 147 165 149 120 316 22 14 2

There were no deaths over the age of 65; and from 15 years onwards, the death rate decreased so rapidly that from the 1000 only 38 deaths occurred in the later years of life. Tripe ("The Mortality from the Eruptive Fevers at Different Periods of the year" London, 1857) has arranged 1000 deaths in England from scarlet fever, according to years, thus;--

During the 1st year	65 deaths
From 1-2 years	147 "
" 2-3 "	165 "
" 3-4 "	149 "
" 4-5 "	120 "
" 5-15 "	316 "
" 15-25 "	22 "
" 25-45 "	14 "
" 45-65 "	2 "

Total..... 1000

These figures bring out the fact that the greatest number of cases are to be found between the ages of one and five; next to that between five and fifteen, the number with rapidity diminishing thereafter; also that the percentage during the first <sup>any</sup> year is comparatively small, being about 6.7 per cent. 9.3 per cent, and 6.5 per cent, respectively. Observations the world over give practically the same results; and even the youngest children have been known to contract the disease.

Thus, Veit (Berl. klin. Woch., 1868, p.452) has described the case of a child, born on October 3rd, 1856, who was taken ill with scarlet fever on the 17th after the brother eleven years old had been seized



on the 1st of October. Meynet (V--H. Jahr., 1871), 11, p. 249) has reported the case of a woman who, three weeks after the convalescence of her husband, and three months after the death of her child from scarlatina, was delivered of a girl who was somewhat red when born; the redness became more intense on the following day, and the skin felt very hot. These symptoms diminished after a few days, but again became more intense on the 13th day; on the fifteenth day was observed the well-developed redness of scarlatina on the whole body tongue and palate; the tonsils were swollen, and there was fever and apparent difficulty of deglutition. On the seventeenth day the redness had almost entirely disappeared, and the general condition was good; but during the subsequent fortnight desquamation had not yet appeared, which makes the case somewhat doubtful. Asmuss (Cst. Jahr., 1842, 1. p.526) likewise records a similar and somewhat doubtful case, as desquamation frequently appears even in healthy new-born children, in whom there is no suspicion of scarlatina. A mother had lost two children towards the end of her pregnancy from scarlatina, and soon after her confinement became dropsical. In her new-born child who was very much emaciated, the epidermis over the whole body separated in large sheets; from the hands it came off like gloves; the child afterwards recovered completely. Noirot (Histoire de la Scarlatine, Paris, 1847) mentions the case of a woman who took scarlatina on the morning of the day of her confinement, and died a fortnight after, and that her child, though immediately isolated after birth, nevertheless became affected with intense scarlatina, but recovered completely.

#### THE SO-CALLED "SURGICAL SCARLATINA"

It is now generally believed that wounds render a patient liable to somewhat more ready infection by scarlatina than otherwise were the case. Those convalescent from surgical operations, or others bearing wounds at the time of exposure have been known to contract the disease, though not always. In these cases there is, of course, a risk of confusing the various types of post-operative or traumatic erythema with the true scarlatina eruptions, and mistakes can scarcely be avoided so long as the diagnosis of the so-called "surgical scarlatina" is persisted in being made on the basis of the rash alone. We must, therefore, limit the term "scarlet fever" to those cases in which, in addition to the eruption, other typical symptoms of the disease--angina, glandular swelling, desquamation, possibly

nephritis-- are present. Hoffa (In von Volkmann's Sammlung klin. Vorträge, No. 22, Section on Chirurgie, No. 90, S. 2679, 1886 and 1887, pp. 2679 et seq.) Very probably excludes such cases as are not certainly scarlatinal, and that by dividing these post-operative scarlatinoid erythemas into three classes;--

1. ERYTHEMA CONGESTIVUM- A local whealing of the skin, appearing a few hours after a trifling operation, such as circumcisions, and just as probably disappearing, leaving no trace behind. It appears most frequently in injuries of or interferences with portions of the body that are rich in nerve-supply, and the condition may be regarded as in a measure a sensory phenomenon dependent upon the vasomotor nerves, and partly as a reflex symptom.

2. ERYTHEMA TOXICUM- This conforms in all particulars to the nature of the erythemata that occur after the use of certain drugs, as the balsams. It is believed that in such cases there are present in the blood certain secretions from the wound, or destroyed tissue materials due to the injury; and fibrin ferment to be the cause. Certain it is that after the use of anaesthetics, and in cases of poisoning with phenol or mercuric chloride, these erythemata can manifest themselves. One in particular presents an extraordinary resemblance to scarlatina in the form of a punctate reddening of the skin. Other forms show more of the well-known larger spots, separated by unaffected areas. Only the trunk and limbs are affected, the eruption lasts about 24 hours, and no desquamation ensues. It is very remarkable moreover, that general symptoms, a suddenly oncoming high fever, in certain cases with brain symptoms and gastric disturbance, accompany the appearance of the erythema.

### 3. AFFECTIONS OF THE SKIN ASSOCIATED WITH SEPSIS-

Hoffa considers the diagnosis of scarlatina assured only when, in addition to the characteristic exanthem, at least one or other of the signs that make up the symptoms complex of the disease is present, as angina, swelling of the submaxillary glands, desquamation, or nephritis; and that it becomes absolutely certain if other patients that have come in contact with such a case also become infected.

Sir James Paget (B.M.J., 1864, ii. 237) regarded it as probable that his patients, who were taken ill ~~xx~~ a very short time - from three to six days - after the operation, had already been infected with scarlatina before it, but that the effects of the infection would not have set in so soon, and perhaps not at all, if the health had not been disturbed by



operative interference.

Henoch (Berl.klin. Woch., 1895, No. 22, 6. 682) has drawn attention to the great susceptibility of children operated upon for various diseases; and Hagenbach (Jahr. f. kinderh., N.F. Vol. XXIV, p. 115) points out the unusually short period of incubation in these cases, and the extraordinary susceptibility of patients with tracheotomy wounds.

Five cases of a general scarlatina following local post-operative erysipelas have been reported by Bruner (Berl. klin. Woch., 1895, No.ww. pp. 469 et seq.)

That scarlatina can originate from wounds has been determined likewise by Von Leube ("Specielle Diagnose der inneren krankheiten "-- Bd. 11, S. 364, 2nd and 3rd edns., Leipzig, 1893) who in the course of an interesting account of a personal experience states that he considered himself to have a veryslight tendency to scarlatina, since neither as a child, when several of his brothers and sisters were ill of the disease, was he attacked, nor later on, when attending to his patients. One day he happened to wound the index-finger of his left hand during the autopsy upon the cadaver of a case that had died of an unusually severe attack of scarlatina. On the seventh day after the injury to his finger the wound, which had only imperfectly healed, began to pain; then early in the tenth day he became unwell and angina appeared. On the eleventh day vomiting, and a decided fever followed, and at the end of the same day the scarlatinal exanthem appeared. This, however, contrary to the usual procedure, spread first from the original lesion, following the lymphatic vessels up to the left arm in the form of a broad red stripe, and then rapidly extended over the rest of his body. The general course of the disease was one of medium severity; and the desquamation began also on the left arm.

It follows, therefore, that the evidence justifies a presumption that the presence of accidental or operative wounds in some mysterious way lessens the resistance of the individual against scarlet fever: the more efficient the aseptic and antiseptic treatment adopted the less common will the disease become.

#### PUERPERAL SCARLATINA--

Puerperal women are believed to be very liable to an attack of scarlatina. It has often been observed how a woman may be admitted from a house in which scarlet fever is prevailing to a hospital, and assigned to a bed next to that occupied by a woman about to be confined. Three days after delivery the puerperal woman takes scarlet fever, and gives it to another lying-in patient. The



writer knows of the case of a medical man, in whose family scarlatina was prevailing, attending three women in their confinement in succession; and all contracted scarlet fever of a severe kind. It is the writer's custom, therefore, not to go directly from a scarlet fever patient to a labour case, but avoids the risk by intermediate visits to other patients by remaining for a time in the open air.

There appears to be good reason to believe that the contagion of zymotic diseases may produce a form of disease indistinguishable from ordinary puerperal septicaemia, and presenting none of the characteristic features of the specific complaint from which the contagium was derived. This opinion whilst usually admitted in this country does not seem to be allowed by continental writers. It is certainly difficult to reconcile this with the theory of septicaemia, and at the best a satisfactory explanation cannot be given of it. The writer considers that the evidence in favour of the possibility of puerperal septicaemia originating in this way is strong enough to warrant a belief as to its probability. The scarlatinal poison is that regarding which perhaps the greatest number of observations have been made. Numerous cases of this kind are to be found scattered throughout obstetric literature; although, taking a general survey of the frequency of the affection, it cannot be said to be very common.

Prior to 1876 Olshausen (Arch f. Gyn., Bd. IX. S. 169) collected 134 cases; and Winckel (Path. u. Therap. des Wochenbettes, 1875, p. 529) Palmer (Cincinnati Lancet-Clinic, 1887, IX. 481), Parvin (Amer. Jour. med. Sci., 1884, 179), Busby (Ibid. 1887, p. 394,) Harvey (Scarlet Fever and the Puerperal State, New York medical record, 1886, XXX) and Cummings (B.M.J., 1884, i. 760) have reported single cases. Braxton Hicks (London Obstetric Trans., vol. XII, pp. 44--113) asserts that out of 68 cases of puerperal disease seen in consultation, no less than 37 were distinctly traceable to the poison of scarlet fever. Of these, 20 had the characteristic exanthem of the disease, but the remaining 17, although the history clearly proved exposure to the contagion of scarlet fever, showed none of its usual symptoms, and were not to be distinguished from ordinary typical cases of so-called puerperal fever.

Epidemics of scarlet fever among puerperal women are described by Bloxall (London Obstet. Trans, 1888) and Meyer ("Ueber Scharlach bei Wochennerinnen"---Zeit.f. Geburtsh., Bd. XIV, S. 289), in which, respectively 16 and 18 women were attacked by the disease. Meyer, describing the epidemic in the Maternat

Hospital of Copenhagen, states that only about one per cent acquired the disease, while Bloxall remarks that 40 women were exposed to scarlatina without contracting the disease. The former likewise tells that during the years 1871-- 1885 there were only 2 cases of scarlet fever during the puerperium, among the patients at the Copenhagen Maternity; in six years but 3 cases of the kind were seen in the hospital for infectious diseases.

Parturition appears to furnish the conditions suitable for septic poisoning, and the efflorescence which often accompanies septicaemia bears a very close resemblance to that of scarlet fever. Hence, in many instances, the same difficulty is present in making a differential diagnosis between septic and scarlatinous blood-poisoning in midwifery cases which occurs in surgical practice. Usually an exanthem occurring during the seven days following parturition is septic; only in exceptional cases ~~can~~ can it be regarded as scarlatinous, and there is not a great danger that the accoucheur, engaged in general practice and visiting scarlet fever patients, will communicate the infection ~~mentioned~~ of that disease if the precaution already mentioned be taken. If it be possible, however, as some believe, that the scarlatinal poison can sometimes produce in parturient women a puerperal fever in which the characteristic scarlatinal symptoms are lacking, and which, in the present state of our knowledge, is not distinguishable from ordinary septic fever, certainly the scarlatinal virus sustains a much more frequent causative relation to childbed fever than has been heretofore supposed.

Henoch (Berlin klin. Woch., 1895, No. 22, p. 682) believes that the susceptibility of puerperal women to scarlet fever may be referred to the same conditions as exist in surgical cases, that is the existence of a large surface allowing of the easy absorption of the poison, predisposed to by the debilitation of the patient. It is obviously not easy to distinguish from true scarlet fever the puerperal scarlatina, which, again, is but a severe general septicaemia with an erythematous rash. The occurrence in Great Britain of the greatest number of the cases is specially dilated upon by Von Jurgensen (Nathnagel's specielle Pathol. und Therapie, Vienna, 1896), who maintains from the statistics of Braxton Hicks and others that British women more than German are subject to puerperal erythemas, and doubts the significance of these in every case. That scarlatina not infrequently complicates the puerperium is admitted by Runge (Lehrbuch der Geburtshilfe, Berlin, 1898, p. 564), who also believes that the disease is more often seen in this country, and mentions also the fact that scarlatina epidemics have



been noticed in Germany & Switzerland in large institutions.

Putting aside the possibility of many of the reported cases of so-called scarlatina being merely simple septicaemia, it appears then to be beyond question that lying-in women (pregnant and puerperal) are specially predisposed to suffer from exposure to the scarlatina poison.

As specially pointed out by Olshausen (Volkmann's "Samml. klin. Vortr., No. 292) the vast majority (four-fifths) of all puerperal attack with scarlatina manifest the first symptoms within the first three days after delivery.

Scarlet fever occurring during the puerperium may often present certain peculiarities. According to Oldshausen (loc. cit.) the disease may be modified in three ways; (1) it almost - as stated - always appears in the first three days after labour; (2) the angina is slight; (3) the eruption appears quickly, and is rapidly diffused over the body, and is apt to assume a dark-red colour - Winckel (loc. cit.) states that the convalescence in these cases is much prolonged.

That the occurrence of scarlet fever in the puerperal state exerts an unfavourable influence upon the case cannot be doubted. Thus, the milk-secretion is usually either lessened or suppressed; and the lochia is so altered as to lead to the suspicion of an exanthematous endometritis or a diphtheritic vaginitis. In some cases the foetid odour of the lochia is very noticeable, in others it may only be peculiar. Many of the reported cases contain no mention of the discharges being altered.

Meyer (loc. cit.) describes 10 cases with rheumatic complications, and six with ~~epidemic~~ evidence of peri- and parametritis. Olshausen (loc. cit.) reports 21 cases with tenderness over the uterus; and pelvic inflammation has been described on innumerable occasions, so that it must be regarded as being more than a coincidence. During the course of the illness diarrhoea may develop, and is an unfavourable sign. Twenty-one of Olshausen's cases were thus affected and 15 died.

Provided the attack be of an ordinary kind and free from extensive involvement of the genitali, and extensive pelvic inflammation such patients usually recover. The prognosis of puerperal cases is, however, not invariably favourable. Thus Olshausen (loc. cit.) reports a general death-rate in his cases of 48 per cent; in those infected immediately after labour, 75 per cent. Meyer (loc. cit.) had no death in 18 cases; 27 of Braxton Hicks' 27 patients died, but some of these, however, must



have been merely puerperal sepsis with erythema. Gakabin (Discussion on Bloxall's paper loc. cit.) records two cases of fatal peritonitis during desquamation; whereas all of Bloxall's cases recovered; Legendre (Cited by Parvin, loc. cit.) attended 23 cases without a death; and all the single instances recorded by Palmer Harvey, Parvin, and Cummins made a complete recovery.

#### INFLUENCE OF PREVIOUS DISEASE-

It cannot with any approach to certainty be determined whether previous diseases increase or diminish the susceptibility to the contagion of scarlet fever. It has~~as~~ been said that the disease but seldom attacks phthisical patients, nor those afflicted with scrofula. Gillespie (Jahr. f. kinderh. 23. p. 152) gives it as his experience that deaf-mutes are more susceptible than others. Children suffering from whooping-cough are likewise said to frequently undergo exposure to the infection with impunity.

A few cases are also recorded of scarlet fever occurring<sup>or soon</sup> after an attack of measles, small-pox, chicken-pox, typhoid fever, mumps, and erysipelas; and in them it seems to have run its course in a<sup>very</sup> but little, if at all, modified by the pre-existing infection.

#### INFLUENCE OF SEX.

The influence of sex exerts but a slight effect, if any, upon the predisposition to scarlet fever. During the various epidemics studied it can be seen that while in one case males were affected, in the other the affection occurred more frequently in females; generally the difference is inconsiderable. That young boys are sometimes seen to be more<sup>often</sup> affected is probably due to their numerical preponderance; that women, among adults, may seem to be more predisposed is most likely from their frequent and close attendance upon the sick affording them more opportunity for infection.

The following statistics will serve to illustrate the variety of experience recorded: Murchison (Contributions to the Etiology, Pathology, and Treatment of Scarlet Fever"-- Lancet, ii, 1864);-

Age	Males	Females	xxx
Below 5 years	51	49	
5-15 years	about equal		
16-55 years	46	54	

Johannessen (loc. cit.); During the twelve years, 1867 to 1875, there were notified in Norway of Scarlatina cases:

Males	30,425	or	49.2 per cent
Females	31,425	or	50.8 per cent.

Relative number per thousand between the scarlatina patients and the total number of inhabitants of both sexes.

Males	2.85. per cent	Females	2.82 per cent
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According to age;

	Males		Females
1-15 years	19.06 per cent.	1-15 years	19.77 per cent
15-45 "	1.17 "	15-45 years	1.97 per cent

#### RACIAL INFLUENCES;-

It cannot be decided whether race has any influence on the spread and character of scarlatina owing to the lack of reliable evidence. Epidemics in tropical and subtropical regions - in the Antilles, the Brazilian coast, Chili, Peru, Smyrna - have been observed to be of a malignant type, but such have chiefly concerned the white races there who in Europe also suffer intensely from the disease. According to Sr. Alves (Jahr. f. kinderheilk, 9, p. 213) scarlatina first appeared among the Brazilian Indians in 1828, and then occurred sporadically, but in the year 1833 and afterwards, it raged with fearful intensity. During the fifties it was there considered the most malignant disease, and in Montevideo affected whites and blacks in equal degree. According to Murchison (loc. cit.) Scarlatina has never made a distinction between the several races and natures of New Zealand; North and South America appear to have suffered like Europe. Stratton (Jahr. f. kinderh, 6. p. 336), however, relates that among his Canadian patients he observed fewer Indians and half-breeds than French and English; whilst Stevenson (Ibid. 59. p. 116) reports that, negroes in Pennsylvania are less susceptible than whites; and Majer (Ibid. 56. p. 202) declares that Jews are also distinguished by a slighter predisposition to scarlet fever, though this is denied by other authors.

Hirsch (loc. cit. p. 137) maintains that race has no influence of any kind whatever upon scarlatina, and cites Frick, of Baltimore, who states that

in the epidemics there between 1850 and 1854, the relation of scarlatina, whites to blacks, in a population of 10,000 was as 13.8 to 10.8. During the Rebellion (Medical and Surgical History of the Rebellion, vol. 111, Part. 1 ) the number of cases of scarlet fever, among the soldiers, was 378 whites with 70 deaths, to 118 blacks with 2 deaths. Applying these figures in connection with the relative numbers of white and negro soldiers, the ratio of morbidity was 64 coloured to 26 white, the mortality being 70 deaths among the latter class and only 2 among the former. Other statistics certainly show a difference in mortality as between whites and blacks, but whether this predisposition is in favor of the one race or the other it is impossible to decide.

#### SOCIAL POSITION AND SANITARY SURROUNDINGS.

The social position of the individual, though to a degree, influencing the death-rate from scarlet fever, seems to have no important effect upon individual susceptibility. Authorities are at variance as to the effect of social conditions and sanitary surroundings, some emphasizing the fact that rich and poor alike, when exposed to the infection, contract the disease with equal readiness.

The variety of experience recorded can only be regarded as indicative of no great difference in the predisposition of the poor and the rich. In Berlin, from 1876 to 1883, the mortality was observed to be ~~xxxxxx~~ less among those living upon the lower than those occupying the upper floors of the same tenements, being, indeed greatest upon the better aired fourth floor.

Jurgenson (loc. cit.) and other state that all grades of society suffer about equally, so too those who live amidst bad sanitary conditions and those who do not. One would naturally expect the poor to contract the disease oftener than the rich. Though this is common enough, it is by no means always the case, and the contrary has been often observed. Even those living in old and badly ventilated courts have been noted to enjoy a comparative immunity. Hillier ("Ueber das Scharlach und seine Folgen"-- Jour. f. Kinderkr., XXXIX, 1862) has known scarlet fever to be even more fatal to the children of the rich than those of the poor.

So far as Mortality is concerned, statistics prove it increases with poverty and decreases with affluence, though to a lesser degree than is the case with measles. Position and wealth in themselves are, however, of no special influence; the lesser mortality among the affluent being due to the better care which such patients receive, to their



more complete protection against infection by isolation, and to the lesser concentration perhaps of the virus in their roomier, cleaner, and better ventilated dwellings. Still further if affluence in itself were of any material influence on the individual predisposition, the disproportion between the rich and the poor would be more manifest than we find it.

To epitomize; the cause of the larger number of scarlet fever patients and deaths among the poorer classes, is ~~xxx~~ to be found in the existence of certain conditions which are of minor importance as regards the predisposition in general.

#### INFLUENCE OF SOIL AND LOCALITY.

Some authorities have claimed for the condition of the soil an influence upon the occurrence of scarlet fever as regards severity or mildness. Thus it has been observed that while scarlatina attacks one village in a severe form a neighbouring one - the inhabitants of both maintaining a free and constant intercourse - remains exempt or suffers a very mild epidemic.

The mortality from the disease exhibits marked variation as regards cities. Thus, from 1868 to 1872, there were in London 2,516,468 cases of acute exanthemata of which nearly 115,000 (four and four sevenths per cent) were Scarlatina; the number of deaths in Paris, from that disease, during five years was 67, but in Berlin there were, in 1877-83, no less than 5,428 deaths from scarlatina alone. The fact of Berlin and London being hot-beds for the disease and Paris being next thing to immune, whilst it must be taken into consideration, cannot be satisfactorily explained.

Compared with the country the mortality from scarlet fever is greater in cities: in many of the latter the disease has come to be regarded as epidemic, while in the former the number of cases observed depends upon the epidemic character of the disease.

#### CONTAGIOUSNESS.

The occurrence of scarlet fever depends either on direct or indirect exposure to the poison, and upon nothing else. The shortest contact with the contagious atmosphere of the sick-room may suffice for infection. Mus Palante (V-- H Jahr., 1866. 11, p. 250) describes how a mother, after remaining only a moment with a scarlatina patient, immediately returned home, a distance of about six miles, but communicated the disease to her children in whom it developed a few days later. Hennig (loc. cit.) reports the case of a child who was affected four

~~times~~ days after having been but a short time in the company of another child who had been taken ill with scarlatina six weeks before. On the whole, however, the volatility of the poison of scarlet fever is less than that of measles, and, therefore, spreads less rapidly throughout a dwelling than the latter, from which it follows that the isolation of the unaffected members of a family, if done early and efficiently, will, and usually does, prevent a further spread of the disease. The fact has long been established that a dilution of the poison by painstaking ventilation either diminishes or entirely removes the opportunity for infection. Though the origin of the disease can often be traced to indirect transmission, and in other cases cannot be explained, it usually happens that the disease is spread by direct contagion, and from an intimate contact with an infected person.

Not yet knowing the exact nature of the scarlatina poison, it is, quite impossible to dogmatize its chief seat in the patient's body. We know by experience that it abounds in the pharynx, in discharges from cavities the seat of specific lesions, in the normal excretions, the scales of desquamation, and the circulating blood. It is as yet difficult to determine whether the poison in the latter can give rise to an intra-uterine infection during gestation, for the cases appearing in the literature by way of proving the possibility of congenital scarlatina do not all of them exclude some other source of infection after delivery. It is not easy to tell that a child has been born with scarlet fever as it is by no means rare to find an infant born with a scarlet tint of the skin, proceeding thereafter to desquamation. The possibility of the disease being transmitted to a child by a sick mother is, however, worth remembering, as likewise the fact that mothers suffering from scarlatina have given birth to children who have remained free from the disease. As illustrative of the former, Tortual (Cited by Thomas, loc. cit.) has described the case of a woman, aged 30, previously uninfected, who nursed her husband and soon, ill with scarlet fever, until shortly before her accouchement, which took place on 19th September, 1823. The infant (a male) was observed to be unable to swallow, to have what looked like a typical scarlatina exanthem, and an intense reddening of the mucous membrane of the mouth and tongue. The dysphagia lasted until the fifth day, on the ninth day profuse desquamation began; later the nails of the fingers and toes fell off, the child thereafter recovering.

Lemoine (Bull et Mem. Soc. Méd. des Hôp. des

Paris, 1895 and 1896; Gaz. des Hop. de Paris, Nov. 25. 1895. p. 1337) believes the specific virus to be very largely contained in the pharyngeal lesions, and that the contagion of the skin is to a great extent derived from the secretions of the throat and pharynx which have dried upon it. This theory, however, whilst presumably true where pharyngeal lesions are extensive and severe, obviously do not explain the contagiousness of the disease in cases of mild angina, or or the frequent ~~occurrence~~ occurrence of infection in the early stages of scarlatina before the pharyngeal lesions are at all developed. There must be some other means of the propagation of contagion, and this probably, by efforts of coughing, vomiting, etc. causing the poison to be swept from the mucous membrane containing it, and disseminated through the air.

The same difficulty presents itself as regards the absorption of the poison. It may, in the absence of evidence to the contrary, be presumed that the virus may be absorbed from the respiratory tract, from the gastro-intestinal tract, or, again, through a wound in the skin or mucous membrane -- Grunbaines Experiment--  
CONVEYANCE BY MILK

The question as to whether milk can become the vehicle of contagion has long attracted attention. Reviewing the literature, Hall (N.Y. med. Rec., Nov. 11. 1899. p. 698) remarks that while scarlet fever occurs in epidemic form in those countries where cows milk forms a staple article of food, especially among children, it does not occur in countries where cow's milk is not used as a food, or where children are raised on mother's milk alone. This certainly applies to India and Japan, and may be nothing more than a co-incidence.

In 1875 Bell (Schmidt's Jahr. 1875. 312) reported that several cases of scarlatina had occurred in all houses (excepting one occupied by very aged persons) to which milk had been conveyed by a peasant and her son, the milk-boy, who had both undergone attacks of scarlatina. Taylor (Schmidt's Jb., 43. p. 39) notices that one of the first severe cases which initiated an epidemic, occurred in the house of a milkman, whose wife milked the cows; the milk being supplied to about 12 families in the city. In 6 of these, cases of scarlet fever occurred in rapid succession, at a time when the disease was not epidemic, and without any communication having taken place between those that became affected and the person who had brought the milk. It is very probable that in this instance the milk was the carrier of the contagion, as, previous to its distribution to the several consumers, it had stood in a kitchen, which had before been used



by scarlatinous patients.

One of the most important investigations made into the nature of milk epidemics was by Freeman (Med. (Medical Record, March 29, 1896), who has discussed the occurrence of 53 epidemics of typhoid fever due to milk infection, 26 of scarlet fever, 11 of diphtheria, 2 of foot- and - mouth disease, 3 of angina, 2 of septicaemia, and 1 of cholera, all since 1880, and chiefly amongst infants. The same observer refers the disease propagated by milk into three classes; (1) Those in which the pathogenic bacilli are conveyed by the milk from the diseased cow, e.g., tuberculosis, anthrax, foot-and-mouth disease, and acute enteritis. (2) Those in which the organisms are introduced into the milk during or after milking, from outside sources, e.g. in cholera, typhoid fever, and diphtheria (3) Those in which the milk contains poisons developed by bacteria.

The following general phenomena characterize milk epidemics of any disease mentioned;-

(1) The cases appear suddenly, many new ones each day, and the subsidence is equally prompt after the contaminated milk supply is stopped (2) The houses invaded are often quite distant from each other, and not restricted to a particular part of the town (3) The houses of the rich are more apt to be seriously invaded than those of the poor (4) Those members of each family who are milk consumers are most liable to be infected; thus, Freeman mentions that 78 per cent. of the special milk-drinkers were affected, while only 27 per cent. of those not such were affected (5) Those who have used the milk of a particular milk-supply will be found affected, while others escape. (6) In many instances the epidemics have been preceded by disease among the dairy people themselves or their families.

With special reference to scarlet fever the same author emphasizes his belief in certain epidemics of that disease being as a matter of fact, due to contaminated milk; and mentions that 15 out of 26 recent epidemics in England had occurred in connection with contamination from man. Likewise the fact of no milk epidemics having been observed in America is entirely due to the milk-supply not being enquired into.

#### ANIMALS AS A VEHICLE OF CONTAGION.

It has already been noted that, in the absence of evidence of contamination, Klein has attributed the occurrence of certain epidemics to disease of the Cow's udders. This view, however, has not met with acceptance.

In the same way that in healthy persons have been known to carry the contagion to others, it has been held that, in some instances, animals may be the carriers of the poison. The belief of certain writers that animals may be affected with a true scarlatina, as in man, remains an open question. The disease is said to have been observed in the horse, the dog, cat, swine, and other domestic animals. Thus, Heim ('Rust's Magazine, 28.p.72) has reported that a dog which had lain in the same bed with a scarlatinous child, was taken ill with pyrexia, followed by scarlatina and desquamation. A cat was said to have developed a general scarlatinous eruption with sore-throat, as also the same in swine, whilst Krauss (Wurt. Corresp., 1855, XXV. p. 1) relates that during the epidemic of scarlatina at Waddorf, young cattle were seen to be suffering from enlargement of the cervical glands. These and other instances contained in the literature, cannot be unreservedly taken as those of scarlet fever, pending the discovery of the specific bacillus.

#### TRANSMISSION BY HEALTHY INDIVIDUALS.

That the contagion of scarlet fever may be transmitted by healthy or unaffected individuals who have nursed or come in contact with scarlatinous patients, is an established fact. It probably takes place through the medium of their clothing. Thus, William (loc. cit.) tells of a nurse who came from a scarlet fever patient and three hours afterwards conveyed the infection to a child recovering from tracheotomy. Williams (Schmidt's Jahr., 21. p. 139) states that it has come to his knowledge that midwives have communicated the disease to lying-in women, and Murchison mentions the same happening through physicians. Pyle (Centralbl., 1871, p. 655) relates the case of a healthy female teacher, who, without being affected herself, communicated the disease at home, by the dress which she had worn while nursing a scarlet fever patient, and Rehn (Joch. f. kinderrh., 1869. p. 439) how a woman carried the contagion from Stuttgart to Hanan, thus infecting her grandson. Kostlin (Wurt. Corresp. 1854.p.171) mentions how a physician carried the infection to a child undergoing close isolation for measles. Thoresen (Pr. Vischr. 116. p. 12. d. Anz. - V. H. Jber. 1867 11. p. 278 states that in the epidemic near Eidsvold, in Norway, the intense cold of winter kept the children indoors, so that a majority of infections could only have taken place through the medium of healthy individuals. According to Zengerle (Wurt. Corresp.,

1841, p. 353) a healthy woman, after a visit to a scarlatinous patient communicated the disease to her daughter, who was the first patient in the district.

A unique case illustrating the <sup>conveyance of</sup> poison by healthy individuals, who remained well, is given as a footnote (Allbutt's system of Medicine (Vol. ii. p. 129); "A father, staying in the house of a friend, met, on the platform of a railway station, thirty miles away, his son, who came to this station from a school where scarlet fever was then prevalent. The two spent an hour and a half together and then returned to their respective quarters. Within the next four days, the lady of the house to which the father returned fell ill and died of malignant scarlet fever. The father and son remained well."

TENACITY OF THE POISON:) That the poison of scarlet fever is possessed of an extraordinary tenacity cannot be doubted. Thus Murchison (loc. cit.) states he has often found that when a family had left an infected house fresh cases of the disease occurred upon its being reoccupied, even after the dwelling had been empty for many months: Hildebrand (Ueber die anst. Typhus., 2Aufl., Wien. 1814, p. 150) states that his infected coat remained in that condition for one year and a half. Prior (Oest. Jb. f. Pad., 1876. p. 223, d. An.) reports that the surviving children of a mother, who had lost two out of three affected with scarlatina were taken ill after the clothing of the deceased was worn, though the residence had been changed. The contagion has been described as retaining its tenacity nine or ten weeks, by Hennig; (Schmidt's Jb. 76. p. 369; Jbch. f. Kinderh., 1871, IV. p. 78) and others. All such observations indicate that the contagion is not ~~xx~~ a volatile gas, but a solid material, which easily and firmly adheres to other substances. That it is less volatile than the poison of other acute exanthemata is being constantly proved by outbreaks in childrens hospital, or private houses, where, if the patient be promptly isolated, infection occurs only in those exposed before the adoption of such procedure; from which it follows, the same, ~~xxxxxxxx~~ rigidly enforced, will prevent the spread of the disease more certainly than in the cases of such affections as measles and small-pox.

The limited diffusion of the poison about the patient is well illustrated by Forchheimer (loc. cit. p. 15) who mentions that children in one house talked through the open windows to other children, ill or convalescent from scarlet fever, in the next house at a distance of only nine feet and did not contract the disease.

Both the method of propagation of <sup>the</sup> poison and its great tenacity can be shown by the case described



by Boeck (cited by Johannessen - loc. cit., pp. 162 - 163 ) from which it appears that some children were allowed to play with various articles stowed away in an old writing desk, in one of the drawers of which were hitherto undisturbed locks of hair from two children who twenty years before had died of scarlet fever: the children handling these locks of hair developed typical scarlatina in a few days, and were the first cases in the city. Thomas (loc. cit.) p. 164), has shown that a letter, a box of toys, a shawl, a violin, a piano, and the cushions of a chair, have all harboured and propagated the infection. The danger of the patients bed-linen doing likewise is obvious. Loeb (Jahr. f. Kinderheilk. N.F., vol. LX. p. 174) proves how a healthy individual may carry the infection, describing the attack of scarlatina in his young daughter as a case in point: After visiting three scarlatinous children at Mannheim Dr. von Essingen returned to Worms, and on the afternoon of the same day, while paying a social call at the house of Dr. Loeb, without having taken the precaution to change his dress, took one little daughter of the latter upon his knee, with the result that on the following day she developed a typical scarlatina.

The vitality of the contagion for two generations is mentioned by Hatfield ("Scarlet Fever"--American Text-Book of the Diseases of Children, 1894, p. 157) who relates that it remained in a chest of drawers for 35 years, after this communicating the disease to a grandchild wearing some of its grandfather's clothes.

The tenacity of the poison, thus illustrated, depends entirely upon the intensity of its virulence, and can accordingly last for an unlimited number of years.

#### WHEN A PERSON MAY COMMUNICATE THE CONTAGION.

The question, at which period of his affection a scarlet fever patient may communicate the disease, and the duration of his capacity of infecting others is obviously an important one, and in the face of the conflicting statements of writers thereon is not easy to answer. We may take it, however, as established that scarlet fever is contagious from the date of appearance of the first symptoms until the completion of desquamation. According to Eichhorst (Specielle Pathologie und Therapie, Leipzig, 1897, vol. LV. p. 231) it is most contagious during the eruptive period, least so during the stage of incubation, and gradually becomes less and less so as desquamation proceeds. Osler (Practice of Medicine, 1896, p. 71) remarks that not until the eruption appears is the disease contagious, and

that it is most active during desquamation. Holt. (loc. cit) maintains the greatest infectivity is during the pyrexial period, the contagiosity lasting on the average for six weeks, while Sanne (Traite' Clinique et Pratique des Maladies des Enfants; Paris, 1891) refers the greatest contagiosity of the disease to the desquamation period. Several cases, however, of the disease not being spread by desquamating patients - soldiers - are recorded by Lemoine (Bull. et. Mem. Soc. Méd. de Hôp. de Paris, 1895, S., III. pp. 738. et seq). The classic case described by Trousseau (Clinical Medicine, 1873) clearly proves that scarlet fever may be contracted during the earliest stages of the disease: A London merchant, who had been spending the winter in Pau with one of his daughters, planned, on his return, to England, to visit Paris for several days, and his eldest daughter, who had been looking after his London residence during his absence, crossed over to Paris to meet her father and sister, but whilst crossing the English Channel was taken ill with sore throat and fever. She reached her father's hotel in Paris but a short <sup>while</sup> after the arrival of the latter and the patient's sister, and at once took to bed with a severe attack of the disease: within 24 hours it developed in her sister as well, though the malady was then epidemic in London it had not yet occurred in Pau.

Scarlatina has been known to be transmitted from the sick to the healthy even after all signs of desquamation have disappeared. This has been proved by Wood (Therap. Gaz., vol. i. 1889, p. 739) and Bond (B.M.J., Feb., 1887, p. 277) The latter relates how a child, six weeks after the onset of a mild attack of scarlatina, was dismissed from the Hospital, fifteen days after the completion of desquamation, and on arriving at home slept with a sister, who developed the disease after five days. Wood's cases are of a similar nature, and with Bond's would indicate that contagion is located elsewhere than in the epidemic scales; probably as Lemoine has suggested in the throat. Volz (Schmidt's Jahrb. 67. p. 214) in fact, totally denies the contagiousness of the epidermal desquamation.

#### PECULIARITY OF SCARLATINA EPIDEMICS AS COMPARED WITH MEASLES.

The spread of these two diseases is entirely different. Thus, in the case of measles the disease is never entirely absent from large cities; the reverse holds good as regards scarlet fever. Still further, while isolated cases of measles are usually the forerunners of the epidemic, or continue for some time as its scattered remnants, sporadic cases of scarlatina have been observed comparatively

frequently and in greater or lesser numbers, and the disease is also ~~x~~ more permanent in those regions continually visited by it than is the case with measles.

#### VARIATION IN SEVERITY OF EPIDEMICS.--

The symptom-complex known as scarlatina to a greater degree perhaps than any other infectious disease exhibits variation in its manifestations, appearing at one time, it may be, in the form of a severe, at another, in the form of a mild epidemic. The same variation has even been noticed in sporadic cases. The epidemic described by Sydenham (*Opera Omnia*) was so mild that he considered scarlatina as unworthy of ~~the~~ the name of a disease, whereas two years later the continuance of this same epidemic was observed to be of extraordinary virulence. The great range of scarlet fever as regards mortality--from 3 to 30 per cent. does not allow of explanation, nor the severity of individual infections. No definite factors, of any kind whatsoever, appear to be capable of influencing it. A very remarkable variation was observed by Greaves and Gerhard (*System of Clinical Medicine*, 1848) as regards the epidemics which devastated Ireland from 1800 to 1804, and the subsequent long periods of mild epidemics which lasted to 1831, when, as well as in 1834 frightfully malignant outbreaks occurred. The epidemic at the Canary Islands, in 1873--75, afford ~~and~~ an excellent illustration of the variation of the irregular and protracted course of scarlatina, in this case for as many months as weeks compared with measles.

#### PERIODICITY OF EPIDEMICS.

Though this appeared to have been marked in certain cases, scarlatina seems to lack the regular periodicity assigned to measles by many writers, who, whilst differing as to details, do so only to a slight extent in that what one terms a small epidemic, another regards as an accumulation of sporadic cases. The reports of ~~a~~ numerous observers scattered throughout the literature, show that if a certain periodicity had been noted in some localities, in others it was entirely absent: in no case was this periodicity stated to be possessed of the regularity attributed to measles.

#### PANDEMIC CHARACTER OF EPIDEMICS.

Occasionally scarlet fever has been seen to assume a pandemic character or at least to spread over large tracts of land, as, for instance, according to Hirsch (loc. cit. p. 129) in Germany in 1818, in Denmark, England, Germany and France in 1825 and 1826, in Ireland and Russia in 1832 - 35, in Germany



and England in 1846- 49 , in the United States of America in 1821, and over the whole of ~~the~~ South America from 1831 to 1837. The spread of the disease over distantly separated countries may be taken to indicate that the disease is influenced by atmosphere or climatic conditons, in a way as yet impossible of explanation.

#### PERSONAL INTERCOURSE IN THE SPREAD OF THE DISEASE.

In the origin and propagation of scarlet fever personal intercourse is admitted to be largely etiologic, and in many cases it is the only factor apparent, whilst in others the intermingling of the sick and the healthy has not been followed by a marked spread of the poison. Under the ordinary conditions of life the schools are of paramount importance ~~xxx~~ in the transmission of the disease, as is the case also with measles. Once the contagion has entered the school-room it rapidly develops under the favouring influences of warmth, bad air, etc., and children - the most susceptible and pre-disposed of all persons - may thus become infected in much larger numbers than would be possible under the ordinary circumstances of daily intercourse.

Why smaller localities sometimes suffer more intensely than larger, and why sometimes there is no proportion between the predisposition to and mortality of scarlatina and the density of the poison can be explained by the fact that personal intercourse cannot always overcome the causes which, in densely populated districts and overcrowded localities diminish - in some mysterious way - the individual predisposition. Thus, according to Murchison (loc. cit. the number of deaths from scarlet fever in four of the poorest and most crowded districts of London, in 1863, was one death in 668 inhabitants, while at the same time, in the four richest districts, the proportion was one in 447 inhabitants.

#### OTHER SUPPOSED WAYS OF PROPAGATION.

There is no evidence to conclusively prove that scarlatina can be spread in any other way than by either direct or indirect personal intercourse. It has been stated (V.--H. Jb. 1871.11. p. 247 ) that the contagion may arise from the offensive odours emanating from the ground when slaughter-house offal is used for manuring purposes; a number of cases have been described as examples where under these circumstances scarlet fever have been of frequent occurrence. In view of the present belief--to negative which no reliable evidence can be produced-- that animals are not susceptible to scarlet fever (were they capable of being infected with

scarlatina, their offal would, of course, be able to spread the disease), this opinion cannot be accepted; and the author considers that if these substances exert any influence it is by increasing the predisposition of those living in the neighbourhood, who suffer from scarlet fever in consequence of an accidental contact with the contagion from other regions, not, however, by the spontaneous evolution of the poison from these offensive substances. The fact, moreover, of improvements in domestic sanitary arrangements of dwellings having no influence upon the spread of scarlatina proves this.

## P A T H O L O G Y

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Whatever be the nature of the post-mortem lesions observed in scarlet fever they are due to either (1) the action of the toxin, or (2) a mixed infection of pyogenic bacteria (staphylococcus or streptococcus), pneumococcus etc, but owing to our ignorance as regards the specific bacillus the organism which in a given case is most etiologic of the condition found cannot be determined. Generally considered, in cases dying before the development of secondary infections, the ~~anatomic~~ changes are ~~probably~~ due to the specific scarlatina organism, whereas those dying after the development of secondary infections the lesions are caused by other bacteria in addition.

### SKIN ERUPTION.

Usually the exanthem so characteristic of scarlet fever is not seen in the bodies of patients who have died during the eruptive stage; sometimes, however, when the inflammation has been very severe, the skin still appears red, and in these cases, the cutaneous vessels contain much blood.

The ~~absence~~ of the changes can be described as hyperaemia with moderate exudation in the normal forms, a corresponding exudation where there are papules

and vesicles within the papillae and the rete Malpighi; and haemorrhage into the papillae, and the cutis where petechiae are found.

That the process is an inflammatory one is denied by so excellent an authority as Unna (Orth's *Lehrbuch der Spec. Path. Anat.*, 1894, vol. 11. pp 629 et seq.), who states that. at the height of the exanthem a marked shrinking of the epidermis is present, while the blood vessels of the cutis and papillae are widely dilated, the turgescence of the skin, so often seen at this stage being due to this, rather than to an actual oedema. The same authority draws attention to the constancy of a remarkable absence of any true inflammatory exudation of leucocytes, and mentions how, towards the end of the eruptive stage, and that with the commencement of desquamation, collections of connective tissue cells are usually to be seen about the vessels of the papillae; how no plasma cells are formed, ~~which~~ while mast-cells, in any quantity, are first observed with the establishment of desquamation; and how the rete Malpighi shows no marked early changes, mitosis occurring first during desquamation. Unna claims the development of oedema to be a co-existent condition of neurotoxic origin, not due to the erythema, the entire process being the result of a vaso-motor disturbance, and not a true inflammation.

Jurgensen (loc. cit.. p.p. 114 et seq. ) whilst agreeing with Unna that a true interstitial oedema of the cutis is exceptional, adds that instead of the cutaneous lesion being of an inflammatory nature, it is due entirely to a vasomotor paralysis of the peripheral vessels induced by the specific circulating poison.

Thomas (loc. cit.. p.p. 202 et seq.) refers the changes to a hyperaemia and exudation into the rete malpighi.

Zeigler (*Lehrbuch der spec. Pathol. Anatom.*, Jena 1895, vol. 11, p. 416 ) considers the lesion as due to an extensive cellular exudation into the sub-cutaneous tissues, and describes the process as a n inflammatory one. (Kaposi ("Path. und Therap. der Hautkr", 1889, Berlin and Vienna, p. 243) considers the cutaneous changes as hyperaemia and exudative, and the papillary and vesicular eruptions as arising from an excessive exudation and cell-proliferation in the papillae and rete malpighi.

Pearce (Boston City Hospital reports) X. Series, 1899, p. 50) states that there occurs an early dilatation and congestion of the blood-vessels, slight dilatation of the lymphatics, and accumulation of a few leucocytes and lymphoid cells about the



lymphatic vessels beneath the rete malpighi; together with - later, from the fifth to the tenth day - a marked infiltration of the epithelium with polymorphonuclear leucocytes, often mixed with the desquamating epithelial cells and red blood corpuscles, the deeper cells, at the same time occasionally showing mitosis.

Thomas (loc. cit.) has shown that the exanthem itself bears no relation to the minute bright-red points in the eruption, which are but small focal areas of intense dilatation and congestion, and occur most markedly about the hair follicles.

Desquamation occurs in the superficial layers of the epidermis, usually early over those areas where the eruption first appeared, as now believed to be due, not, as Sanne' (Bull. de la Soc. des Hop. de Paris, 1895, and Dictionnaire encyclop. des Sci. Med. 3. S. VII. 1879) has contended, to a mechanical uplifting of the cells, but to the direct results of trophic disturbances of the older cells of the skin, the same also occurring in the same way, in connection with the hair, nails, developing teeth, and other epithelioid structures, as warts, which Moore (Eruptive and continued Fevers, N.Y., 1892 p. 171) reports as being detached during a scarlatinal attack.

#### MUCOUS MEMBRANE OF THE PHARYNX, NOSE, AND TONGUE-

The changes seen here are practically identical with those occurring upon the skin - viz. dilatation and congestion of the blood-vessels, followed by an infiltration of leucocytes. In the tongue, however, the process begins earlier, and is much more intense: Pearce (loc. cit.) has drawn attention to the marked involvement of the papillae which occurs.

#### LYMPHATIC SYSTEM.

The lymphatic glands are affected with great constancy in scarlet fever. As a rule, quite early, in the disease the superficial glands (especially those of the axillary, popliteal, and inguinal regions) are markedly swollen, and the autopsy in a fatal case, in the first stage of the disease, not infrequently reveals considerable enlargement of the deeper glands. Owing to their intimate connection with the throat, the lymphatic glands of the neck are most prone to be affected; but it must not be supposed that the intensity of affection of the former is in direct proportion to the degree of involvement of the latter, for many cases are met with in which the contrary is true. These glands not infrequently proceed to suppuration and abscess; and the spleen is frequently greatly swollen. In

severe cases all the lymphoid structures of the body have been seen to be affected, including even those of the intestine. According to Klein (Report on the Minute anatomy of Scarlatina. Report Privy Council, London, Vll. 1876) the mononuclear cells are very much diminished in number and are replaced by giant cells, the ~~xxxx~~ of plugs of fibrin within the veins of the cervical glands. Crooke (Zur Path. Anat. des Scharlachs," Fort. der Med.iii. 1885); Birmingham Medical Review, XX, 1886; XXI, 1887) describes, in the intestine, his finding of inflammatory hyperplasia of the lymph follicles, together with large accumulations of round cells in the mucosa almost amounting to the formation of pseudo - follicles.

#### SPLEEN

There is no uniformity in the lesions found in the spleen. Many have reported this organ as being of normal size whether the case died early or late in the disease, others again moderately enlarged, sometimes exsanguinous or hyperaemic, of a firm consistence, and sometimes softened. As a rule, a slight enlargement can be demonstrated in severe cases of scarlet fever, during life. The histological changes consist of affection of the blood-vessels: thickening of the adventitia, hyaline swelling of the intima -- the lumen being sometimes occluded, -- proliferation of the muscular cells of the media; in addition to which there is usually to be found hyaline degeneration near the blood vessels, with changes in the central portions of the Malliphan bodies similar to those found in the lymph follicles.

#### HEART--

The anatomic lesions found in the heart following scarlet fever may be due to the occurrence of a mixed affection from staphylococci or streptococci in the circulating blood, or may arise as a result of the scarlatinal toxin alone.

Clinically the occurrence of acute dilatation alone indicates ~~that~~ an affect of the latter upon the cardiac muscle. It may develop with great rapidity the more so if the kidney be affected as well. According to Steffen ("Ueber einige Wichtige Krankh. des Kindlichen Alters," Tübingen, 1895, p. 211), acute dilatation may take place so rapidly that within 24 to 48 hours the apex beat may be found in the anterior axillary line, the left side of the heart necessarily becoming dilated, and the right side perhaps a little also. Silberman (Jahr. f. Kinderh., vol. XVII, p. 178) has shown an acute hypertrophy of the left ventricle may follow this dilatation, while Romberg (loc. cit.) has seen an acute and extensive myocarditis to occur. Pericarditis may or may not be found in

association with effusion. Inflammation of the pericardium, whilst common enough during life, is usually only detected at the autopsy, when the results of the process will in such cases be found in the exudate, frequently produced by streptococcus or staphylococcus; serum, fibrinous coagula, sero-purulent fluid, rarely pus, and still more rarely haemorrhagic effusions. The quantity of fluid blood in connection with dropsical effusions may be enormous, the same mechanically interfering with the dilatation of the heart. Chiefly when accompanied by nephritis is the quantity of fluid large, but it has been observed to be considerable even in ordinary cases. Pericardial adhesions are frequently observed.

Endocarditis is a common complication of scarlatina and differs in no way from the ordinary form of that lesion. It is to be found upon the margins of the valves, in the left heart, as a rule, and in mild cases as mere excrescences, in severe ones, as verrucoid lesions. These sometimes heal up, produce the usual complications, or again lead to cerebral embolism or pulmonary infarction by detachment of the fibrinous accumulations. The endocardial lesion though sometimes occurring as a result of the circulating scarlatinal toxin (Romberg. loc. cit) is in the vast majority of cases due to a mixed infection of staphylococcus pyogenes aureus, staphylococcus pyogenes albus, streptococcus pyogenes, the bacillus foetidus, etc. (Frankel--Centralbl. f. klin. Med. VI. 1885; Kleds--Corresp. f. Schweizer Aerzte, 1883)

The lesions described are by no means invariably located to the three situations named; all three parts may be affected simultaneously, i.e. a pancarditis occurs.

#### KIDNEYS.

Next to the skin, throat, and the associated lymphatic glands, the kidneys are the organs most frequently affected by scarlet fever. Nevertheless in a great many of the cases which recover, they remain entirely normal, as they have frequently been found in cases which have proved fatal from some other cause, either early or late in the course of the disease.

The subject of the renal affections has been repeatedly studied; some observers describing the lesions as confined to the parenchyma; others to the interstitial tissue; whereas a mixed form of nephritis has been frequently reported.

The nature of the kidney lesion of scarlatina has been described by many writers as glomerular. Thos. Klein (loc. cit.) in 1876, stated that the



nuclei on the surface of the Malpighian tufts are increased, some of the blood-vessels are closed by emboli, but more commonly there is an increase in the walls of the smallest arteries, whose walls seemed thickened. Besides this there is found swelling of the epithelium of the convoluted tubules and proliferation of the nuclei. In the beginning interstitial changes are slight, but after the ninth day they are just as well marked as the parenchymatous changes and consist of round cell infiltration, starting from around the large blood-vessels, entering into the base of the pyramids and cortical substance and causing more or less atrophy by pressure. At the same time the uriniferous tubules become filled with lymphoid cells, granular fatty epithelial detritus and various kinds of casts. Klein adds that the extent of the parenchymatous nephritis depends upon the degree of the interstitial affection, the latter occurring regularly when the patient dies after the ninth day of the disease.

In 1876, Klebs (Handbuch Pathol. Anat. Berlin, 1876, vol. i. p. 632) attributed the diminished urination and the uraemic poisoning in certain cases in which the kidneys do not exhibit any macroscopic change, to a glomerular nephritis; and states that, in the cases he examined, the kidneys were found slightly or not at all enlarged, firm, and the parenchyma hyperaemic. Only the glomeruli appeared, on close inspection, pale like small white dots. The urinary tubules were often not changed at all. Occasionally the convoluted tubules were slightly cloudy. The microscope showed that there were neither interstitial changes nor proliferation of epithelium, and, leaving out the glomeruli, the congestion of the kidneys alone remained to account for the symptoms observed during life. But that mere congestion is insufficient to produce the symptoms appears from the fact that it does not produce them under other circumstances. Klebs found on microscopic examination of the glomerulus, the whole space filled with small somewhat angular nuclei, imbedded in a fine granular accumulation, the vessels of the glomerulus being almost completely covered by nuclear masses.

Commenting upon these findings by Klebs, Klein declares that in all early cases which he examined he observed great abundance of nuclei of the glomeruli, but a condition like that described by Klebs, he has seen in only a few glomeruli; for a general state of these bodies, as described by this observer, and such an extensive proliferation of the nuclei that the blood vessels are completely compressed, was not seen in one of the 23 cases examined. Klein, therefore, questions whether the diminished urination

and retention of urea, in scarlet fever, when the kidneys do not exhibit any conspicuous catarrhal or other change, is due, unless in exceptional instances, to compression of the vessels of the glomeruli nuclear germination, but believes, rather, that the obstructed circulation, and consequent diminished urinary excretion, is largely due to the changed state of the arterioles. Klein adds that perhaps undue contraction of the arterioles, through stimulation by the blood-irritant, may also be a factor in causing the arrest of circulation in the Maliphan corpuscles. As regards cases that perished early, he found the parenchymatous change slight, so that a careful examination was required in order to detect cloudy swelling and granular degeneration.

Wagner (Deut. Arch. f. klin. Med., 1880, vol. XXV, pp. 529 et seq.), in 1880, declared that he had never observed a pure glomerular nephritis to follow scarlet fever.

Based upon a study of the scarlatinous kidney in ~~xxx~~ 229 fatal cases, Friedlander (Fortschritte der Med., 1883, vol. i., p. 81) arranges classification of lesions thus; 1. Initial Catarrhal Nephritis (the Early Form occurring coincidentally with or immediately following the Eruption)-- The kidneys are in a state of moderate hyperaemia, the glomeruli appearing as small, red points, but there is no marked cloudiness of the cortical substance. The microscope reveals cloudy swelling of the tubular epithelium, the glomerular tufts unaltered, the capsular epithelium slightly thickened, and occasionally a small quantity of albuminous Exudate between the capsule and glomerulus. 2. The large, Pale Haemorrhagic Kidney (Interstitial Nephritis: Septic Nephritis) - This variety is rare -- occurring only in 12 Cases--- and may develop in the first, third or fourth week of scarlatina. The kidneys are large and pale with grayish-red cortex; the glomeruli are not usually visible; and, as a rule, large numbers of small, punctate haemorrhages are observed. Under the microscope: marked infiltration of the interstitial tissue, with small round cells, is noticed, but very little alteration of the epithelial cells. These conditions are usually found in association with severe diphtheritic affections of the throat, abscesses in the neck, etc, as well as in severe septic scarlatinal nephritis with small foci of bacteria in the renal tissue. 3. Glomerular nephritis (Post-scarlatinal Nephritis).

Friedlander regards this as almost characteristic of scarlet fever. He encountered it in 43 of his 229 cases. To the naked eye the kidneys appear to be hyperaemic: their consistency is increased, as the glomeruli appear as small grayish

points, slightly larger than normal. The microscope shows the lesions to be confined to the glomeruli, the latter being enlarged, their nuclei greatly increased, the glomerular loops converted into a solid mass, the capsular epithelium usually slightly thickened, and the interstitial tissue normal.

As is found with other forms of renal affection, so with scarlatinal nephritis the conditions are not so simple as to be reducible to a scheme of this sort.

Councilman (Boston City Hospital Reports, VIII Series, 1897, pp. 38 et seq.)

declares that in all serious lesions of the kidneys in one case the glomeruli are principally involved, while in other cases, again, there are interstitial changes consisting of an active cell-proliferation. Based upon anatomic findings he classified the acute diffuse nephritis thus;--

1 Acute degeneration nephritis, occurring chiefly in infectious diseases.

2. Acute glomerular nephritis, occurring in infectious diseases, notably in acute endocarditis, measles, and diphtheria

3 Acute hemorrhagic nephritis.

4. Acute interstitial non-suppurative nephritis, occurring notably in diphtheria and scarlet fever.

Councilman described three cases of pure interstitial nephritis, following scarlatina, in which the glomeruli were unchanged, and one case in which the glomeruli were increased in size, the capsules dilated and filled with epithelial cells, and the cells in the glomeruli themselves increased in number but without connective tissue hyperplasia or proliferation of the connective tissue cells.

To Epitomize; The renal lesions occurring in association with scarlet fever are :

Acute degenerative nephritis, occurring early, with cloudy swelling; hyaline and fatty degeneration of the epithelium, which undergoes desquamation, the changes being purely degenerative; followed by acute interstitial nephritis, characterized by a proliferation between the tubules, with no glomerular changes. Rarely a true parenchymatous, or acute glomerular nephritis, characterized by changes in the glomeruli, may be present at this time, usually without evidence of any proliferation of the inter-tubular cells; while later, after the establishment of convalescence, a pure glomerulonephritis may be found, or even changes due to an interstitial, as well as a parenchymatous nephritis.

LIVER The changes in the liver consist principally of a thickening and round-cell infiltration of the connective tissue and cloudy swelling of the hepatic



cells, while in some cases interstitial ~~hepatitis~~ is well marked and sometimes the round-cell infiltration is intralobular. The findings are substantially the same as found in many other diseases, simply as the result of the fever.

On a very flaccid, exsanguineous normal-sized liver of a fatal case, of 48 hours duration, and in the same organ, enlarged by half its size, of a child three ~~xx~~ years of age, who died at the end of three and a half weeks, of diphtheria, complicating scarlet fever, Wagner (Beitr. zur. Pathol. Anatom. des Scharlachs," Arch f. Heilk., Vlll, 1867), who was the first to describe the condition of the liver in scarlatina, found numerous - here and there one or two upon the surface of an acinus) white granules, for the most part very small, but some of them ~~large~~ and easily perceptible to the naked eye, which proved to be lymphoid new growths, and besides these he observed, by the aid of the microscope, and particularly in the interacinous connective tissue, numerous collections of cells and nuclei. The capsule of the liver contained similar granules. ~~xxxx~~ A similar finding has been recorded by Huguenin (Pathol. Unters. Zurich, 1869 p. 68), while Biermer (Wurtburg Verh. Sitzb. f. 1859, p. 27. X, 1860, Virchow's Arch. 19. p. 5, 3 7) has described a peculiar form of interstitial ~~hepatitis~~. The latter has also been seen by Crooke (loc. cit.) and others.

#### GASTRO-INTESTINAL TRACT.

##### Stomach;

Fenwick (Medico-chir. Trans, 1862, XLvii, p. 209) has demonstrated that the mucous membrane of the stomach participates in the general process of desquamation of the epidermis, that in mild cases, more than severe ones, there is an absolute loss of epithelium, as well as great infection and blocking of the gastric follicles with a variety of cellular detritus.

Pearce (loc. cit.) found surface of the stomach of a case dying the second day to be covered with a thick layer of mucus and necrotic epithelial cells, with marked infiltration of polymorpho-nuclear leucocytes; irregular masses of cocci were also present; the lymph-nodules in the lower part of the mucous ~~membrane~~ ~~xx~~ ~~xxxxxx~~ membrane were enlarged; and the abundance of plasma-cells was observed between the gastric tubules.

Crooke (loc. cit) states that he found catarrhal gastritis in every case specially investigated; and both interstitial, and follicular gastritis in the severe cases.

##### INTESTINE.

According to Virchow (Charite' Annalen, Vll.) the lymph follicles in both intestine and ~~omentum~~ are swollen. Crooke (loc. cit.) found so great

great an inflammatory hyperplasia of the lymph follicles and collection of round cells in the mucosa as to amount almost to the formation of pseudo follicles; the villi were observed to be denuded of epithelium, swollen, and infiltrated, Peyer's plaques presenting an appearance akin to that of the first week of enterica, especially if the patches are ulcerated as was observed by Deiters (D. Klein, 1859, 12.31.32.34) The follicular affection, which sometimes causes small extravasation, may, when it is not of an intense degree, exceptionally and at isolated points of the intestine, cause little ulcers, but in scarlet fever the large ulcerations as seen in enterica, are never met with. Moreover, small extravasations have been found in the mucous membrane, especially in the villi, and Fenwick ("On the Condition of the Stomach and Intestines in Scarlatina;" Medico-Chirurgical Trans. XLVII, 1864) has reported a case in which the latter was very striking. At times a fibrinous exudation may be found on the mucous membrane of the lower portion of the ileum.: it has been reported as having in one case been followed by pyaemic symptoms. Wagner (Loc. cit.) found the whole thickness of the mucous membrane of the jejunum and ileum, and particularly the villi of the former, filled with cells and granules, but there was no trace of ~~any~~ any fibrous formation: the epithelial cells of the glands were opaque and slightly fatty.

The mesenteric glands are generally in a swollen condition, and, when cut into, a good deal of serous fluid may exude.

#### PERITONEUM AND SEROUS MEMBRANES.

The peritoneum may be found to have suffered inflammation and its cavity may contain blood or a serous effusion. Inflammation of any of the serous membranes may occur, with serous or purulent effusion; and although it is common enough in renal disease, it is often independent of it and part of a general susceptibility of that kind of tissue. Although very rare, meningitis is the most striking form of inflammation of serous membrane, sometimes covering with its purulent exudation the entire surface of the brain and its sulci, and is, as a rule, associated with a considerable effusion into the ventricles. Pleurisy of one side is most frequently met with either quite early or late in the disease, and it may or not be attended with pneumonia on the same side. The exudation may be clear or cloudy, sero-fibrinous, and contain some blood, or it may be pure pus; its quantity may be insignificant or

sufficient to fill the plural sac.

#### BONE-MARROW.

In eleven cases, Pearce (loc. cit.) found the bone-marrow to contain a super-abundance of cells (especially when the patient had died at the second or third year of life); giant cells, nucleated red blood-corpuscles, and eosinophile cells were very numerous; lymphoid cells, neutrophile leucocytes, and abundant cells closely resembling the plasma cells, making up the cellular elements.

#### BLOOD.

Hayem (Arch. gen. de Med. Bd. 23) was the first to give a systematic description of the blood in scarlet fever, and stated that he found a loss of 1.000.000 red cells after defervescence; a moderate leucocytosis in average cases, much increased by suppurative processes or severe throat affection; the same also leading to increased fibrin formation. The whole of the blood appears to suffer in a slight degree the usual effects of fever. Heubner (Deut. Arch. klin. Med., Bd. 23) describes the finding of haemoglobinuria in one case, representing the septicaemic type of the disease.

The gradual loss of red cells reported by Hayem was confirmed by Kotschetskoff (Rev. Cent. f. Path., 1892, No. 11) who found a reduction to 3.000.000 or lower in nearly all cases: the regeneration of the blood was slow and complete only after 6 weeks or longer. Zappert (Zeit. f. klin. Med., Bd. 23), on the other hand, found less than 4.000.000 cells in only one of six cases, and Leichtenstern (Deut. med. Woch. 1882), Felsenthal (Arch. f. kinderh. Bd. 15, p. 78,) Arnheim (Jahr. f. kinderh. Bd. 13. p. 293), Pee (Diss Berlin. 1890), Pick. (Pra. med. Woch., 1890, No. 24), and Sadler (Fort. d. Med., 1892, Suppl. Heft.), a very slight anaemia in a considerable number of cases examined at varying periods.

The condition of the leucocytes has been classified by Kotschetskoff (loc. cit.) in three groups: (1) the mild cases, showing between 10.000 and 20.000 white cells, (2) the moderately severe cases, with 20.000 to 30.000 cells, and very severe and usually fatal cases with a leucocytosis of 30.000 to 40.000 cells; while in some rapidly fatal cases over 40.000 leucocytes were found. Nevertheless, 10 cases specially examined by Rieder (Beit. zur. kennt. d. Leucocytose, Leipsic, 1892) never showed more than 25.000 cells, and usually less than 20.000,



although some were complicated with pneumonia and croupous pharyngitis, and were fatal. The six cases in children, examined by Felsenthal (loc. cit.) were of moderate severity and showed 18.000 to 30.000 cells. The leucocytosis appears to begin 1 to 2 days before the appearance of the rash, and to reach its height with or shortly after the full development of the eruption. and while in some cases rapidly falling with the eruption, it nearly always continues for four to five days longer, and very often persists for days or weeks after the temperature has become normal. The grade of leucocytosis seems in general to correspond with the severity of the disease, especially of the throat affection, but not with the height of the temperature. Kotschetskoff (loc. cit.) states that complications such as lymphadenitis, otitis, nephritis, usually have little effect on the leucocytosis, but Pée has seen two cases in which the condition was increased when the lymph nodes began to swell late in the disease, and Rieder (loc. cit.) declares that some of his pneumonia cases showed a slight increase of leucocytes.

The percentage of polynuclear cells is in all cases much increased, varying from 85 to 98 per cent., according to the intensity of the disease, reaching the highest point on the second day of the rash, and thereafter slowly declining. In fatal cases the proportion of polynuclear cells falls but slightly, or soon regains or passes the original figure. The eosinophile cells may show characteristic variations: in all but very severe cases they are normal or subnormal at first, steadily increase after two to three days, reaching a maximum of 8 to 15 per cent. in the second or third weeks, and thereafter slowly, reaching the normal figure about the sixth week. In fatal cases the eosins may disappear early in the disease. The lymphocytes are at first diminished, but later rise to normal proportions.

Though the above description, after Kotschetskoff, covers an average case, it is not always applicable. Thus Weiss (Jahr. f. kinderh., Bd. 25) found no eosins in one case at the height of the exanthem; Rille (Arch. f. Derm. u. Syph., 1892, p. 1028) saw marked eosinophilia in a fatal case; Bensaude (Cited by Bensançon, Arch. gen., 1900, p. 491) observed as high as 20 per cent. of eosins in one instance; Klein (loc. cit) reports leucocytosis during convalescence; and Rieder (loc. cit.), Turk (Klin. Blutuntersuch. Wien., 1898, p. 96), and others have described a high persistent leucocytosis, especially in those cases followed by nephritis or other complications. Turk likewise

described a remarkable change which the leucocytes undergo about the fifth day of the disease, when the poly-nuclear cells rapidly diminish and eosins and lymphocytes rapidly increase, and this "secondary leucocytosis" he likens to the somewhat similar phenomenon seen in small-pox.

#### PANCREAS.

Fenwick (loc. cit.) states that he has found the pancreas in a slight inflammatory condition: others have noticed nothing abnormal.

#### RESPIRATORY TRACT:-

Larynx.. The mucous membrane of the larynx usually remains intact in typical scarlatina; or at most, when the angina is intense, it may be affected very mildly. It is only when the throat affection is very severe, and especially when it becomes gangrenous and is accompanied by inflammation of the connective tissue of the neck - i.e., at the commencement of the attack - that the connective tissue at the entrance of the larynx becomes infiltrated, that the mucous membrane in the region becomes ulcerated and the seat of a purulent catarrh, which may last for a longer or shorter period, and may even lead to oedema of the glottis. The latter, however, may appear at an early period of the disease, during the existence of a general dropsy, and either with or without actual inflammation of the laryngeal mucous membrane. The larynx may also become diseased during the course of scarlet fever from still another cause, namely, diphtheria. The old idea that in scarlet fever the diphtheritic process never extends to the larynx is incorrect; for diphtheria and croup may not only occur during the course of an extensive pharyngeal diphtheria, but may even precede it, in some cases manifesting itself as early as during the prodromal stage of scarlet fever. According to Rühle (Kehlkopfkh., Berlin. 1861), diphtheria, when complicating scarlatina produces very extensive destruction of the tissues. Numerous ulcers extending into the trachea; destruction of the thyroid cartilage, vocal cords, and ventricles, have been reported (Smith - V. - Jber., 1871, 11. p. 250; Jahr.f.Kinderh. 59. p. 119).

BRONCHITIS A moderate amount of bronchial catarrh appears to be quite common during the early stage of the disease in severe cases of scarlatina, and when dropsy follows the attack a bronchial catarrh is almost the rule. In these cases the autopsy reveals a uniform redness of the trachea and bronchial tubes, together with swelling extending to the finest bronchioles. In haemorrhagic scarlet fever punctiform extravasations of blood have also been observed through the bronchial mucous

membrane; and where there has been a diphtheritic complication, false membrane may be found extending a long distance into the lungs.

#### PNEUMONIA.

This, either with or without a simple bronchitis, more rarely complicates scarlet fever than measles, and when it does occur it is only in the most severe cases. It develops under a great variety of forms: generally as a lobular broncho-pneumonia, together with bronchitis, though at other times as a lobular or lobar croupous pneumonia. In scarlet fever haemorrhagic extravasations of blood, of varying number and size, may be found in the lungs; where pyaemia follows scarlet fever, wedge-shaped deposits and abscesses may form in these organs. Gangrene of the lung has also been observed, either in connection with or independently of gangrene affections in other parts of the body.

In one case where death had occurred as a result of anuria and convulsions, Biermer (Wurz. Verh. Sitzb. f. 1859, p. 27, X, 1860; Virchow Arch. 19, p. 537) found that the tissue of the lung, which naturally is peculiarly dry and inelastic, had everywhere become slightly changed: the walls of the alveoli were thicker than usual and beset with numerous nuclei. In the upper lobe of the right lung a hemispherical nodule about the size of a hazel-nut, pretty tough in consistence, and of a uniform grayish red colour, was found projecting slightly above the surface; this mass, upon more careful examination, proved to be composed of separate small round masses, about as large as millet seeds, which were also to be found singly in the neighbouring lung-tissue. The small cells of which these masses were chiefly composed, possessed relatively large and well-defined nuclei, and were so closely crowded together that no trace of the structure of the part could be seen; it was only in the scattered masses that it was possible to determine ~~that~~ the fact that the growth of these cells proceeded from the walls of the alveoli. Similar growths were found in the connective tissue of the pleura.

#### EYE.

The eye may become affected at different times and in various ways during scarlet fever. In severe cases, and generally upon the appearance of the rash, the conjunctiva of the lids and sclerotic shows a glistening appearance with distinct injection of the vessels, and with or without oedema of the lids; this usually disappears sooner or later after the exanthem has faded, the process being accompanied by either very little exudation or none



none at all. In cases of diphtheria of the throat, the same process, has occasionally been known to attack the conjunctiva of the eye, and to often lead to ulcerated destruction of the cornea. Furthermore, the cornea has been known to be affected primarily and independently, usually in the way of rapidly progressing abscesses or suppurating ulcers or pernicious kerato-malacia, in which the cornea of one or both eyes without any marked symptoms, becomes turbid in a few days, is transformed in its totality into a turbid, dirty, grayish-white membrane, and exfoliates piecemeal. Occasionally the inflammatory process may travel from here over the whole uveal tract and cause panophthalmitis. In rare cases a purulent choroiditis or panophthalmitis occurs primarily from embolic processes. Lastly in case of coincident renal disease a peculiar form of retinitis occurs, which is usually seen in both eyes simultaneously and with equal intensity, and which presents the typical picture of albuminuric retinitis upon ophthalmoscopic examination.

#### EAR

During the time that the exanthem appears, and also immediately after its cessation, affections of the ear frequently occur in connection with the throat disease; they are often tardy and may become chronic. It has been stated that while in measles the catarrhal form of inflammation either of the middle ear or of the Eustachian tube is the rule, in scarlet fever that form of inflammation is by far the commonest which leads to the accumulation of pus or muco-pus in the cavities of the middle ear, and by perforation of the membrana tympanum to otorrhea. As a further consequence of the otitis, parts of vital importance to hearing may be bound down by adhesions formed while the mucous membrane was in a swollen condition, or they may even become destroyed altogether; ulcerative destruction of the borders of the perforation in the membrana tympani may also take place, though an extensive acute tissue necrosis rarely occurs in this membrane. It is also rare for the mucous membrane lining the cavities of the middle ear to undergo such tissue necrosis, either with or without an accompanying caries of the subjacent bone; in fact it never occurs, unless the parts have been affected with diphtheria or a very severe inflammation, or the patient is of poor constitution. When the affection is severe the periosteum of the mastoid process, as well as of the squamous and petrous portions may also participate in the process of swelling and pus-formation; sometimes the bone and periosteum of

of these portions become diseased, while the auditory apparatus proper remains unaffected. Lastly we find severe inflammation of the middle ear accompanied by swelling of the skin lining the external auditory canal; also swelling of the soft parts around the ear as collateral or inflammatory oedema; less frequently than oedema is due to the burrowing of pus, especially in the direction of the parotid region.

#### NERVOUS SYSTEM-

Very often nothing abnormal is found in those cases which die early in scarlet fever with severe cerebral symptoms; but in many of them the brain is congested. The hyperaemia will be observed as innumerable red points studded over the brain, and in some portions reddening of white and darkening of the gray substances. The pia mater may likewise be congested; the large veins and sinuses are frequently gorged with blood. Often cerebral lesions and inflammation of the meninges are not common; meningitis, oedema of the brain, effusion into the ventricles, are observed only exceptionally, while apoplexy and thrombosis of the cerebral sinuses, etc., are exceedingly rare. When, however, after hydrocephalic symptoms, death takes place in the later stages of the disease, oedema of the brain and hydrocephalus will be found, and may be ascribed as the cause of death in those cases in which serious disturbance of the nervous system have been the prominent symptoms. Nothing certain is known regarding those anatomical changes of the spinal cord which the symptoms in a few of the serious cases lead us to suppose may exist.

#### JOINTS.

Synovitis occurs most frequently just as desquamation is commencing, but may occur at any other period. The joint affected is sometimes so slight that externally there are no signs of it, the pain being the only symptom; while again it is of so severe a character that the whole region is very much swollen, and the skin of the joint of a bright red colour. It has a serous exudation and runs, as a rule, an acute course. The smaller joints of the extremities are particularly liable to be affected. Still, it is not at all unusual to meet with cases in which the hip, knee, shoulder, and elbow-joints suffer, and now and then the sterno-clavicular, infra-maxillary and vertebral articulations are inflamed. These lesions are all included under the general term "Scarlatinal rheumatism" of the joints. Sometimes, though quite rarely, in place of a more or less acute synovitis with serous effusion, the disease results in suppurative inflammation of the

joint, and consequent ostitis and periostitis, with subsequent caries and necrosis, or in ~~fungous~~ fungous periostitis, or in necrosis; or in inflammation of the ligaments of the joints, or in relaxation of the joint and spontaneous luxation. As a result of the suppurative inflammation of the joint, fistulous ulcers are formed, the connective tissue between the muscles in the neighbourhood of the joint suppurates, the muscles themselves are destroyed, and death ensues from pyaemia.

#### BONES.

The condition of the bone-marrow has already been referred to.

The periosteum and bone become diseased not only in connection with the joint affections or the ulcerations of mucous membranes, as in the nose throat and mouth, or in connection with inflammation of the ear, but any part may become the starting-point of the disease. The morbid process does not attack the periosteum of all the bones at the same time and to the same degree, but at one point it is more, at another less severe; hence it occurs earlier, there later. So also the product of the exudative process varies. It is by no means uncommon for the periostitis to be suppurative and to lead to necrosis; indeed, some have supposed that many of the necrosis occurring in childhood are due to an antecedent scarlet fever. In some cases of extensive suppurative periostitis, Bets (Jour.f. ~~ka~~ kinderh., 16, p. 386) found the ribs diseased in numerous places; Hamburger (Pr. Vischr., 69, p. 24), the metacarpal and metatarsal bones; Kennedy (Jour f. Kinderh., 2. p. 119) separation of epiphyses as a result of scarlatinal bone inflammation, Graves (Klin. Beobach. D.v. Bressler, Leipzig, 1843; Pr. Vjschr. 3, p. 95, d. An.) inflammation of the cervical vertebrae, and Hauff (Wurt. Corresp. 1855, XXV. p. 121, 1856), ostitis at the elbow and knee-joints.

#### MUSCLES.

The fact that scarlet fever sometimes implicates the muscles is shown by the occurrence of isolated abscesses about these structures, or by serous infiltration of single muscles or groups of muscles. But there are other slighter affections, such as pain and difficulty in contraction, and also certain forms of paralysis after scarlet fever, which are of more frequent occurrence than we would suppose from the apparent condition of the parts

#### GENITAL ORGANS.

Anatomical changes in the genital organs, in the early stage of scarlet fever are,



according to Cormack. (Pr. Vjschr., 27. p.101, d Ann; Cst. Jb. 1850, IV. 139), most frequently seen in women, less often in young girls. The condition most frequently met with in a moderate catarrh of the vagina, with hyperaemia of the mucous membrane without ulceration; ~~among~~ among boys, a slight balanitis may occur, with hyperaemia of the ~~urethral~~ urethral mucous membrane. The internal organs of generation in the female are especially liable to be affected during pregnancy, and abortion may take place. Roger (Jahr. f. kinderh., 4. p. 65, 253; Ibid., 51, p. 86) found the testes and tunica albuginea very hyperaemic and somewhat softened, and Weber (Varges Zeit., 1858, XII, p. 89, 169, 273) inflammation of both testes, in consequence, he thinks of scarlatinous parotitis; in one case it was associated with acute hydrocele. The formation of abscess is extremely rare, but it has been observed in the mammae, the labia majoria, etc.

# S Y M P T O M A T O L O G Y

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## CLASSIFICATION IN STAGES.

This can be conveniently done as follows;-

- Stage of incubation (Stadium Incubationis)
  - Stage of Invasion (Stadium Prodromorum)
  - Stage of Eruption (Stadium Eruptionis)
  - Stage of Desquamation (Stadium Desquamationis)
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### STAGE OF INCUBATION ( STADIUM INCUBATIONIS)

A glance at the literature of scarlet fever will show the great difference of opinion that has from time to time been expressed regarding this, the same doubtless resulting from the difficulty experienced in determining with exactness the length of time that has elapsed between exposure to the disease and the appearance of the symptoms. Generally speaking the incubatory period of scarlet fever lasts from a few days to a week, those cases in which it is shortened to a few hours and others in which it is prolonged beyond a week, being notable exceptions to the general rule.

The best known case of shortening of the stage incubation is that recorded by Trousseau (loc. cit.): An Englishman travelling with his daughter towards London, from Pau, where scarlet fever was not prevalent, arrived in Paris at the same time with another daughter, who, on her way from London, had contracted the disease. Both girls lived in the same room, and 24 hours after meeting each other, the daughter who had come from Pau was also attacked. In Hanau, where there was no scarlet fever, Rehn (Jahr. f. Kinderh. 1869, p. 439) saw a child attacked two days after its grandmother had returned from nursing a scarlet fever patient in Stuttgart. Russegger (Aest. med. Jahrb. 1848, 63. Bd. 4. Qu.p. 277) saw a child, who had visited a scarlatina patient at noon, taken ill at night; in another instance, three children visited a sick friend in a neighbouring village; two of these children took scarlatina two days after, and the third was affected on the third day. At Wangen, where previously no scarlatina had occurred, Zengerle (Wurt. Corresp., 1841, p. 353) reports that a girl, ten years of age, was taken ~~with~~ sick two days after her mother had visited a family ill with scarlet fever in a neighbouring town. Heunig (loc. cit.) relates the case of a child, in whom the incubation did not extend beyond two or three days at the furthest. Loschner (Pr.

Vjschr., 11. p. 1, 52; p. 31; 73, p. 150) states that a boy four and a half years old, who entered the hospital for the treatment of a Sarcoma, was attacked one and a half days after his admission, and that the hospital could have been the only source of infection. Murchison ("Contributions to the Etiology, Pathology and Treatment of Scarlet Fever", Lancet, 1864, vol. 11. pp. 481-485) tells of a lady 22 years of age, who was taken ill in less than 24 hours from the time in which a visit had communicated the contagion; also of a girl, 20 years of age, who was taken ill after a short period from nursing a scarlet fever patient, of two girls, 21 and 12 years old respectively, the former being ill after a two, and the latter after a three days' sojourn in an infected dwelling; of a boy, 11 years old, who was attacked a day and a half after a visit of only two hours' duration to a house in which there were scarlatinous patients, and of a man 22 years of age, who became ill three days after a visit to a scarlatinous patient. In the year 1864 Murchison published, 13 cases in all (in none of them ~~did~~ did the incubation exceed six days) as follows:-

Of less than 24 hours duration,	2 cases
" " 31½ " "	1 case
" " 36 " "	1 "
" " 40 " "	1 "
" " 3 days " "	2 "
" " 3½ " "	1 case
" " 4 " "	1 "
" " 5 " "	3 cases
" " 6 " "	1 case.

In 1878, Murchison ("Observations on the Period of incubation of Scarlet Fever", Trans. Clinical Soc., 1878, vol. XI. pp. 238--265) published a series of 75 cases, in none of which the above findings exceeded. Voit (Jahr. f. Kinderh., V. 1872, p. 266) describes the case of a child, in whom the incubation did not exceed three days. In a case observed by Marson (cited by Murchison - loc. cit.) the infection must have ~~been~~ taken place, between 26½ and 31½ hours before the beginning of the attack, the stage of incubation could, therefore, not have exceeded one day and a half at the outside, Fleischmann (Jahr. f. Kinderh., 1870, III. p. 466; Ibid, 1871, IV. p. 166) observed the infection, by scarlatina, of two children suffering from small-pox, who had been placed near the scarlatina ward, and, in each case three days intervened between their admission to the hospital -- i.e., the earliest possible period of infection -- and the beginning of the disease. With like certainty, however, the occurrence of a ~~longer~~ longer period of incubation has been established. Gerhardt (Deut. Arch. f. klin. med., XII, p. 1.) reports that a man who was



attacked with Scarlatina four days after an abscess from which he suffered had been opened with a knife used, for the same purpose in a scarlatinous patient a few hours before. Murchison (loc. cit.) saw a girl, four years old, taken ill, four days, and a youth, sixteen years old, attacked  $4\frac{1}{2}$  days after having entered an infected locality. Gunz (Jahr. f. kinderh., 1862, V. p. 161) describes a case in which the incubation lasted three days, the infection being traceable to a hospital. The duration was the same in a case of Henoch's (loc. cit.) that of a girl who had remained with the infected brother only up to the commencement of the disease, and then had been immediately isolated, ~~xx~~ In this and similar instances one cannot, of course, overlook the circumstance that the individual secondarily affected may have been infected at some other -- time than when the disease commenced in the first patient; for instance during the period of incubation, if it be allowed that the contagion may be produced at that time, and then, also, the contagion may have been derived from an older source, such as the clothing or other articles used by the first patient. In this consideration only those cases are of positive value which can be proved to have had but a single contact with the contagion. Pons (Cst. Jber., 1864, IV. p. 127), who reckoned the period of incubation with certainty at four days, in a case to which he had himself brought the contagion. Thoresen (Pr. Vjschr., 116, p. 12. d. Anz) estimates the germinating period at from two to four days; Zehender (Schmidt's Jahr., 14. p. 75) at from two to five days. Moore (loc. cit.) reports the case of a woman whose period of incubation lasted seven days, also one of a girl with that period less than five days.

The epidemic of the Canary Islands "Sundhedsk. Paarsb.,," 1876. Cited by Jurgensen. "Acute Exanthema, Scharlach, Rotheln, Varicellen," Wien, 1876, p. 7), in 1873--75, which appeared to have originated in the Shetland or Orkney Islands Hoff stated that the average period of incubation was longer than that given by the observers just mentioned, viz. from 8 to 9 days, with a few exceptions. In the same epidemic, however, Petersen (Ibid., p. 8.) found the incubation to be from 9 to 11 days; so also Lund (Ibid.), who, in nine cases, gives it as follows:-

Of 9 days' duration	1 case
" 10       "       "	5 cases
" 11       "       "	3 cases

Hagenbach -- Burkhardt ("Ueber Spitalinfection", Jahr. f. kinderh. N.F., vol. XXIV, pp. 105 et seq.) in a series of 58 cases, found the incubation period to exceed six days, in 38 of them, as follows:-

Of less than	7 days' duration,	3 cases
"	" 8 "	4 "
"	" 9 "	2 "
"	" 10 "	1 case
"	" 12 "	1 case
"	" 13 "	4 cases
"	" 14 "	2 "
"	" 17 "	2 "
"	" 18 "	1 case
"	" 19 "	2 cases.
Of over	20 "	6 "

Veit. (Berl. klin. Woch. 1868, p. 452) calculates the period of incubation at from 12 to 14 days; so also Paasch (Schmidt's Jahr., 95, p. 339), who saw the brother of two infected children taken ill 12 days after they had manifested symptoms of the disease, and Böning (Deut. Klinik, 1870, Nos. 30-33), who observed an interval of 14 days under similar circumstances. Gerhardt (loc. cit.) was also disposed to accept an interval of from 12 to 13 days, and states that very accurate observations made by his assistant indicated an interval of 11 days. But, although the possibility of such a long interval cannot be denied, the writer is nevertheless inclined to believe (on account of the great majority of those cases, occurring in families, which were followed by secondary infections after 4 to 7 days) that an incubation of seven days to the normal, or at least the most frequent interval, and that, on the other hand, shorter or longer intervals can only be regarded as of the nature of clinical curiosities. Some cases in which the interval is longer, might be classified with those uncertain cases in families where from 3 to 5 weeks intervene between the several attacks, and these are certainly not dependent on an unusually protracted incubation, but rather on a retardation of the necessary individual susceptibility; these cases also form the transition to those in which a still longer interval elapses between the affection of a different member of a family, and where the action of a new source of infection is necessary to call forth the later attacks. The incubatory period of scarlet fever is perhaps best estimated by the observation of such cases as have derived the contagion from a common source, and in which the disease manifests itself simultaneously; this is best accomplished by observing the disease as it occurs in families. In these cases a short interval from 4 to 7 days generally elapses between the commencement of the affection in the first case, - i.e., probably the earliest period at which the other members can become infected -- and the time at which the first symptoms develop in them. Observations like those of Böning and Veit, -- mentioned above, --

in which the interval lasted from 11 to 16 days (the average period, therefore, comprising about 14 days) have been reported less frequently. These observations, therefore, which perhaps might be explained as due to variations in the contagiousness of the disease and in the individual susceptibility, cannot alter the rule, that the period of incubation of scarlet fever has an average duration of from 4 to 7 days.

CONDITIONS WHICH MODIFY THE PERIOD OF INCUBATION. The causes which occasion this variation of the incubation period of scarlatina are at present unknown. The incubation has been observed to be much shortened when a case has been infected through a wound - e.g., tracheotomy wounds in children (Hagenbach, loc. cit., p. 115), or in cases of ordinary surgical and accidental wounds. An exception to this, however, is related by von Leube (loc. cit., p. 413). He, whilst making a post-mortem examination of a scarlatinous patient, cut his index finger, and 11 days afterwards became ill with a typical attack of scarlet fever. According to Johannessen ("Die Epidem. Verbreit. des Scharlachfiebers in Norwegen," Christiania, 1884, p. 166) the virulence of the epidemic markedly influences the duration of the stage of incubation, in that the milder the type of the epidemic, the longer; while, the more malignant, the shorter will it be. As a rule, puerperal cases, which show an increased susceptibility, have a shorter incubation.



The period of incubation is, as a rule, destitute of symptoms: the patient does not present any evidence of illness until the stage of invasion begins.

## SCARLATINA SIMPLEX

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### STAGE OF INVASION (STADIUM PRODROMORUM)

The stage of invasion in scarlatina represents that immediately preceding the actual attack; is usually of very short duration; and is attended with indefinite symptoms lasting, as a rule, for not more than 24 hours. Mayr. (loc. cit.) states that he has seen it prolonged to three days; Eichhorst (loc. cit.) considers 24 to 48 hours to represent the average, whilst Henoeh ("Vorlesungen ueber kinderkr.," Berlin, 1897, p. 643) believes an extension of the germinating period to 36 or 48 hours to be quite exceptional, and notes 24 hours as an average finding. The observation by some that the symptoms of this stage bear an intimate relation to the severity of the infection, whilst true in a certain number of cases is by no means constant, and is absolutely denied by Henoeh (loc. cit. p. 643). The duration of this stage has been variously estimated by authors other than those mentioned. Bartheg and Sanne' (Traite' Clinique et Practique des Maladies des Enfants, 111, 1891, Paris) observed it at from 12 to 24 hours or less; Unterberger (Zur Kenntniss der Masern und des Scharlachs"--Jahr. f. kinderh., N.F., XI, 1877), 1 to 2 days, Billington ("Clinical Observations on the early Stages of Scarlet Fever, with suggestions as to Pathology"--Med. Rec. 1878), Archambault (Jahr. uber die Leistungen und Fortsch. der gessamten Med., Virchow-Hirsch, 1882) 22 to 36 hours; Ayer ("Scarlet Fever"--Boston Med. and Surg. Jour., 1880), usually 24 hours, the longest 48 hours; Trousseau (loc. cit.), exceptionally as much as 9 days; Bohn (Gerhardt's Handbuch der kinderkr., 11, Tubingen, 1879), 12 to 24 hours, sometimes as long as 24 days; Hebra (loc. cit.) and Kaposi (Pathol und Therap. der Hautkr., Vienna and Leipsic, 1880) 12 to 24 hours to 2 to 3 days; Leube (Specielle Diagnose derinneren Kraukh., Leipsic, 1881), 1 to 2 days; Moizard ("Scarlatine"--- Traite' des Mal. de Enfants, by Graucher, Comby and Marfan, Paris, 1897), 12 to 36 hours, in one case 6 days, and others from 2 to 3 hours to 2 to 3 days: whilst the older writers mostly regard it as being 24 hours.

The disease is of sudden onset, the person attacked having felt quite well hitherto, especially if a child, who, nevertheless, as well as adults may have presented such initiary symptoms as loss of appetite, irritability and fatigue: children, moreover, often complain of bodily pains and discomfort in the throat. Adults have usually at this early stage more pronounced headache than children, the throat may feel actually sore, and the subjective symptoms noted more pronounced.

Leaving out, however, these preliminary symptoms, which are quite exceptional, the attack of scarlet fever generally occurs suddenly, with headache, sharp fever, and angina, with marked vomiting in the case of children, who also may suffer from convulsions from the onset of the attack. The rapid rise of temperature noted may be preceded by a chilly sensation or an actual rigour, while in other cases a severe diarrhoea, a sudden attack of syncope, or an epileptiform seizure, may introduce the illness. By certain authors, vomiting, in association with convulsions, is regarded as of more frequent occurrence in scarlet fever than any other disease of childhood, with the exception perhaps of small-pox and pneumonia. By the evening of the first or early on the second day, if, as so often happens, the attack has developed late in the afternoon or evening, the temperature will be observed to have risen to 102° F. or more. The pulse is at the same time very rapid (120 to 140) and full, the rapidity being in direct proportion to the age of the child, showing a marked disproportion to the height of the fever (Trousseau - loc. cit.), and often continuing so throughout the attack. Within a very short time tenderness and swelling will be elicited in the submaxillary glands. The appearance of the tongue is of importance: it is coated with a grayish-white fur, has its edges and tip reddened, and the papillae are very prominent. Thirst is a constant symptom, and prostration is of a degree proportionate to the severity of the infection. Examining the mouth at this stage, it will be seen to have its mucous membrane reddened, together with which the uvula and tonsils will be seen to be markedly congested. According to Monti ("Studien über das Verhalten des Schleim bei den acuten Exanthen"--- Jahr. f. Kinderh., N.F., vol. VII p. 227) the eruption appears in the throat of a scarlatina patient very early, namely, late on the first or early on the second day. It will be observed as a diffuse mottled reddening, which,

usually beginning, upon the uvula, soon spreads over the soft and hard palate, pillars of the fauces, and the buccal mucous membrane, usually, however, stopping short of the posterior wall of the pharynx. The mouth is now in a dry condition and the tonsils greatly swollen and their follicles prominent.

So far as the concomitant symptoms are concerned they are akin to those seen at an early stage of almost any acute fever. In adults, prostration is usually well marked. Children remain in a dull apathetic condition, and resent being disturbed, or may be very restless and anxious, while, if the temperature be high, delirium is an early phenomenon, and may be of a very severe kind. The conjunctivae may be hyperaemic - less affected, however, than in measles - the appearance of the eyes denote suffering and the face is flushed. In typical scarlatina objective and subjective pulmonary symptoms are absent; the urine has the features common to the febrile stage, but if the fever be high, it may show a trace of albumin from the first.

#### STAGE OF ERUPTION (STADIUM ERUPTIO NIS).

The eruption characteristic of scarlet fever usually makes its appearance on the first day of the disease, in a few cases on the second day, and in rarer instances at a later period, generally it is seen at about the same time on the neck, chest,xxx and sides of the face and forehead, but especially on the parts first mentioned, in the shape of numerous red points situated close to each other, and spreading rapidly over the rest of the body. On the face and forehead the eruption is sometimes confounded with the flush produced by the fever. When the cheeks are much reddened by the eruption, the very pale colour of the circumference of the lips presents a striking contrast. It is only exceptionally that the face is entirely free from the eruption. The skin has often a tense or turgescient appearance, and sometimes the eruption is preceded by a slight erythema over a greater or smaller surface. As a rule, the extension of the eruption over the whole body takes place in about 12 hours, and the rapidity of its progress is greater than in other acute exanthemata. The time required for the full development of the eruption is very variable; in mild cases the eruption occasionally reaches its height on the evening of the first day; in moderate, on the second; and in severe cases, on the third or fourth day; in rare instances, even later. When the full development occurs early, the eruption is punctiform, each minute point being surrounded by pale skin; when the maximum occurs



later, the eruption becomes more and more confluent, until finally, when it reaches its full development, the neck and body, as well as the greater part of the face and extremities, present an intense uniform scarlet red colour, like unto a "boiled lobster" or "raspberry-juice", but sometimes isolated points of a darker appearance are here and there observed. At the same time the skin is very hot, dry, sensitive to the touch, tense, swollen, and the subcutaneous cellular tissue in various places, especially the cheeks, and eyelids, oedematous. In cases of moderate severity these symptoms are not very well marked, and in mild cases the skin may be normal, with the exception of redness and a moderate increase of temperature. Sudamina often make their appearance at this time; in some cases the vesicles are numerous, in others scanty, while in the milder forms of the disease they are generally absent. In severe cases when the eruption is copious, small extravasations may be seen in some places, especially about the mouths of the hair follicles.

The other symptoms increase or remain unchanged as the eruption progresses to its full development; the tip ~~xxxxx~~ ~~xxxxxx~~ of the tongue becomes very red, and the coating thicker; the latter often now peels off in places, but does not usually disappear completely before the fourth day, after which the tongue presents for several days a characteristic appearance. It is red, smooth, dotted with prominent swollen papillae, and is often somewhat dry, as are also the lips; the angina increases, and the tonsils, which are enlarged, are covered with a yellowish-white exudate. The patient's appetite will now be quite gone; the vomiting has by this time generally ceased, the bowels are constipated, but occasionally there is slight diarrhoea with colicky pains. The fever increases, if it has not attained its height at the outset of the disease, and now rises to nearly 105°F., keeping at this with slight variations in severe cases, and with greater variations in the mild ones. In some instances on the morning of the second day of the disease before the full development of the eruption the temperature shows a considerable remission, or even a complete intermission, and this although the case is otherwise of the usual severity. The pulse is usually very frequent, and may become so rapid that it cannot be counted; now and then, however, without any obvious cause the frequency is only moderate. Occasionally there are pulmonary symptoms, such as cough and pain; these are generally indications of the beginning of some complications. The moderate dyspnoea, which is present is often due to the fever. In the same

way may be explained certain cerebral symptoms, e.g. more or less headache, restlessness, mild nocturnal delirium, sometimes wandering of the mind by day, but more commonly somnolence. The urine at this period is scanty and concentrated, and may contain a trace of blood or albumin, especially if the fever is high: this shows that even at the outset of the disease the kidneys are unmistakably involved, although only in the form of a catarrhal process.

The eruption continues at its maximum only for a short time - a few hours to a half or a whole day - and then begins to fade, first upon the upper part of the body, and afterwards gradually, but with still some rapidity, upon the lower portions, the last trace of it being seen in the broad and slightly infiltrated roselaë on the backs of the hands and feet, and in the sudamina, if there be any. In normal cases the period of decline occupies from 2 to 3, or even 4 days, making the whole duration of the eruption from 3 to 7 days. During this period desquamation commences. In typical cases, while the eruption is fading, the general symptoms subside; the fever moderates, but not so rapidly as to constitute a crisis. The defervescence takes place generally in the form of lysis, with gradually lengthening remissions, and afterwards shortening exacerbations, so that it takes several days before the normal temperature is reached. The frequency of the pulse falls to the normal, following the course of the temperature, the skin becomes moister, loses its turgescence, and at this time subdamina are very apt to form. The swallowing becomes gradually easier and less painful, the redness and swelling of the tonsils subside, and the membranes, if there are any, become detached; the tongue becomes more moist, and by the end of this period the superficial layer of epithelium is regenerated. Fissures in the skin (rhagades) now heal, the appetite continues to improve, digestion becomes normal, the urine more abundant and clearer, the extraneous substances therein - including albumin - disappear. With the fall of the temperature the cerebral symptoms generally subside, the sleep becomes quiet and refreshing, and the patient regains his strength. Convalescence is usually established by the seventh to the ninth day and the patient completely recovers in due course, unless attached by one of the, unfortunately too frequent, complications.

#### STAGE OF DESQUAMATION (STADIUM DESQUAMATIONIS)

The desquamation of scarlet fever exhibits variety as regards its commencement, duration, intensity and form. It may follow close upon the

eruption, or a few days after it, but only in rare cases after the lapse of a few weeks; and the process may either last but a few days, or, when the eruption has been intense and has appeared very early, it may continue for several weeks. Mc. Col- lom (Boston City Hospital Reports, X. Series, 1899, p. 32) has made a special study of 1000 cases, and states that the average duration of the period of desquamation was 50 days. The desquamation may affect either the whole body - sometimes recurring several times ~~xxx~~ on portions of the body that have been strongly affected - or only certain parts: those for instance which have a thicker epidermis, as the palms of the hands and soles of the feet. In the latter case it may also occur on the other parts of the skin, but is not recognizable on account of the minuteness of the scales. To a certain extent the intensity of the desquamation is dependent on the exanthem; an intense exanthem, however, is not invariably followed by an abundant desquamation, nor a feeble marked exanthem by a slight desquamation. This is proved by the fact, corroborated by numerous authors, that a characteristic desquamation may occur on portions of the body on which there has been no eruption whatsoever, and also in patients in whom there has been but little redness of the skin, or even none at all. The explanation of this circumstance is, that hyperaemia is not the sole expression of the cutaneous affection, and that increased proliferation of the epidermis can take place without it. The character of the desquamation varies in different patients and in different parts of the body: it may be branny (desquamatis purfuracea), i.e. fine, small and flaky like unto that of measles, but it is usually lamellar (desquamatis membranacea or lamellosa), and the several lamellae may be either small and delicate or voluminous and thick. Branny desquamation usually occurs on a delicate epidermis, after a mild exanthem, and in the majority of instances follows that form in which the punctate portions of the skin do not become confluent; it also occurs on the face, excepting the forehead, and, as noted, resembles closely the desquamation of measles. The lamellar desquamation is most characteristic on the palmar and plantar surfaces, from which in children broad pieces of dry, unaltered epidermis may be peeled off; in the case of a finger, for instance, the whole epidermal covering may sometimes be drawn off like a glove. Broad surfaces on the forehead and abdomen are sometimes found covered with half-dried epidermis only partially attached to the underlying skin. Portions have been known to separate which were 7 inches long by 3 inches in breadth. Sometimes



the epidermis is seen to exfoliate in the following manner: it becomes elevated in the form of a small vesicle, about as large as a pin's head, but empty and gradually extends towards the periphery, until, by the coalescing of this with neighbouring ones, the skin appears to be separated from its connections over quite large areas. These little vesicles at first resemble the sudamina; afterwards, besides being dry and containing no fluid, they are distinguished from them by the construction of their base, which consists of completely formed dry epidermis. Such vesicles frequently lose their epidermis at an early period, and then appear as circular excavations, which usually extend in a rapid manner by the continued exfoliation of epidermal scales from their margins. The branny and lamellar desquamation on the trunk usually takes place in this way. Sometimes - and this was noted in a few of Mc. Collon's Cases - a second desquamation follows the first, over a limited extent of skin; for instance, immediately after the eruption, has faded, there may be a branny desquamation followed later by one in which the epidermis peels off in lamellae, or both times the desquamation may be lamellar in character; on the other hand, it is rare for desquamation to occur twice over more extended areas of the body or over the whole of it; a still rarer occurrence is it for desquamation to take place more than twice. The literature contains instances in which it has been observed four or more times. Mus Jadioux (Jahr.f. Kinderh., 5. p. 278) describes a case in which a fifth and sixth desquamation appeared within two and a half months after the cessation of the scarlatina, and even then the process did not seem to have ended. In some places the desquamation had a peculiar character; on the scalp it occurred in numerous branny scales, while on the rest of the body it was lamellar in character; on the arms the scales were disposed in parallel circles, like bracelets, an inch in breadth, but in such a manner that their free margins were always turned towards the lower portion, and their attached edges towards the upper portion of the limb; on the trunk the desquamation was similar, but its circular form was less manifest. Several authors have reported cases in which the desquamation involved even the nails of the fingers and toes and some in which alopecia was produced. Warts have been known to drop off and to leave excoriations. After desquamation has ceased, the skin usually remains free from further disease, except in cases of relapse, which are followed by renewed and sometimes very complete desquamation. It is very rare, however, for new resplae and other rashes to appear at this time, when the general course of the disease has been typical.

# SCARLATINA ANGINOSA.

## or SEPTIC SCARLET FEVER

This type of scarlet fever is characterized by the severity of the initial symptoms, and is more common in children than adults. The pharynx and tonsils are early and severely affected, the patient is greatly prostrated, the temperature is high, headache is excruciating, sorethroat is intense, the pharynx is rapidly involved, and severe pain and difficulty in swallowing are noted very early in the attack.

Sudden and violent gastro-intestinal symptoms, with severe and prolonged vomiting usher in the attack in the case of children; while at other times, the same class of patient, there may be severe cerebral disturbance, extreme restlessness, convulsions or mild delirium. The pharynx and tonsils are found to be deeply injected from the first, soon however, becoming swollen and studded here and there with patches of exudate. The temperature rises abruptly to 105 ° F., or higher; the skin is very hot, tense, dry, and sensitive to the touch; the pulse becomes very rapid (140 to 160), small, and calculable with difficulty; thirst is intense; food and liquids are immediately returned by the stomach; the urine is high coloured, concentrated and nearly always albuminous.

The exanthem appears as a rule, within a few hours after the commencement of the illness, and does not often follow a regular course. It may ~~may~~ be first noted upon the chest or neck in the form of small or larger faintly scarlet patches of an irregular outline, which usually last a brief period, disappearing and thereafter reappearing upon the trunk, back, or limbs; it is, moreover, often of a brilliant scarlet or purplish colour; it exhibits a frequent tendency to stain the tissues, or produce minute haemorrhages and petechiae; and in these cases the exanthem is prominent to an extraordinary degree over the *dorsum* of the feet and hands, in which situations it may assume a peculiar, intensely livid appearance.

The appearance of the eruption usually calls forth a further rise of temperature, and at the same time the pulse becomes even more accelerated, the headache, thirst, and soreness of the throat greatly aggravated, and the general prostration more profound. The throat affection now presents a close resemblance to the diphtheritic condition, in that the pharyngeal mucous membrane is intensely inflamed, the tonsils are greatly swollen, and

after the second day the latter may show distinct necrotic cereas in addition to being irregularly covered with a grayish exudate.

Even as early as the second day the dysphagia may debar anything but liquids being taken, and from the onset of the disease the stomach may reject even these. The irritability of the stomach very often persists so that the patient rapidly emaciates from sheer starvation. Apart from this, prostration is pronounced; the urinary symptoms peculiar to the ~~hyper~~ hyperpyretic state are observed; and the patient is very restless, or even delirious, the temperature continues to be elevated - ranging between 103° F and 105° F -- and its curve shows marked irregularities. The pharyngeal symptoms increase in severity, and the tongue is thickly coated, swollen, the papillae prominent, the tip and edges reddened, and early assumes the strawberry appearance. With the advance of the inflammation and necrosis of the tonsils, ulceration occurs, extensive sloughs form, the discharge of detritus of exudate and tissue, causing, usually the most distressing cough and profuse expectoration. The cervical glands are greatly swollen and very sensitive to the touch; an excessive infiltration of the cellular tissue of the neck takes place, and this may be so intense as to cause the overstretched tissue to encircle the neck like a collar. The posterior nasopharynx may become implicated in an extension of the pharyngeal inflammation, leading to a muco-purulent nasal discharge, irritating the alae of the nose, and producing painful fissures (rhagades) there, or the inflammation may travel up the Eustachian tubes, involving one or both ears, with subsequent rupture of the membrane tympani and the purulent otorrhoea. The first sound of the heart may early become weak, and about the fourth to the sixth day it may be quite indistinguishable from the second. Dilatation occurs in rare cases and transitory murmurs detected. With the progress of the disease the urine becomes even more scanty, so that it may be almost suppressed, and - sometimes as early as the fourth or fifth day - slight uraemic twitchings may be observed. A grave sign at this stage of the disease is a weak and rapid pulse (130 to 150) in association with marked irregularity. Cerebral disturbances - restlessness with active delirium, or extreme apathy and stupour - may at this time be pronounced, and indicate the septicaemic condition.

Very often, and usually about the sixth or seventh day, there is a change for the better,



and the patient may be considered as practically out of danger, or again improvement in the symptoms does not take place until the second week. In cases which are going to recover, the temperature falls; the pulse slows down and shows marked all-round improvement; in addition to which the cerebral disturbance gradually lessens; the pharyngeal lesions slowly resolve; the affection of the lymphatic glands subsides, more and more urine is voided; desquamation commences about the beginning of the third week; but is so tardy as sometimes to be incomplete as late as the twelfth week, then it may be still seen occurring between the fingers and toes) and convalescence is gradually established. Many cases, however, prove fatal (either directly from the toxæmia, or indirectly from some complication), and in them the temperature early becomes more irregularly septic in type, with a daily variation of three or more degrees, ranging between 103° and 106° F., or even higher; the pulse grows weaker, more rapid and irregular; the respirations may be quick and short, or slow and laboured; the pharyngeal lesion is extreme, and the general ~~prostration~~ prostration most marked. The patient sinks into a condition of apathy and stupour, sometimes of great restlessness followed by active delirium, and, later, coma; and the patient dies in the typhoid state about the beginning of the second week, or sometimes at the end of the first.

## SCARLATINA MALIGNA (TOXIC SCARLET FEVER)

This type of the disease- also termed "la scarlatine foudroyante" - occurs in only about a per cent of all cases of scarlatina, and is therefore, and fortunately, rare. The symptoms which characterize it are severe from the beginning and of sudden onset, being those of an overwhelming intoxication by the scarlatinal poison. The nervous symptoms usually predominate at first, such as intense headache restlessness or stupor, muscular twitchings and perhaps, delirium or even convulsions. Many of these cases pass into coma and die within two or three days, succumbing to the intensity of the toxæmia while the malady is still in its commencement. The rash is dusky, disappearing by pressure and returns slowly when the pressure is removed, showing extreme sluggishness of the capillary circulation. Some patients are very drowsy, lying in a semi-comatose state except when roused, and even then are very restless. Others are extremely restless, and if placed in one position in the bed they throw themselves into another in a semi-conscious or unconscious state. They do not usually speak or mutter like those affected with typhus. The axillary temperature is usually  $103^{\circ}$  F., but it has been seen at  $105^{\circ}$  F., or  $107^{\circ}$  F., The skin is very hot, except when the case is approaching a fatal termination. The pulse from the first is rapid (ranging from 130 as the minimum in a malignant case to a frequency which defies estimation) and is usually feeble and compressible. Irritability of the stomach is one of the commonest symptoms in grave cases, so that patients immediately reject the nourishment and stimulants which are so urgently required to sustain the vital powers. The vomiting, therefore, is frequent and severe, greatly increases the danger, and in many cases is associated with diarrhoea, which also tends to increase the prostration. Severe and dangerous nervous symptoms, due to the intensity or activity of the scarlatinal poison, occur chiefly within the first three days; grinding of the teeth, muscular twitchings, delirium, convulsions, and profound stupor occur for the most part within this period, after which the danger is mainly from exhaustion, unless in the second week or subsequently, when nervous symptoms may arise from uræmia. Those who survive the onset of malignant scarlet fever often have in the course of a few days a severe inflammatory affection of the pharynx, the same usually

in association with inflammation of the lymphatic glands and connective tissue around the angle of the lower jaw; and these inflammations cause more or less external swellings. The faucial turgescence round the entrance of the larynx, with the accompanying secretion of viscid mucus or mucus, often causes noisy respiration, and the patient may at this stage breathe with the mouth constantly open.

Some authors enumerate ataxic, adynamic; and haemorrhagic forms, such terms being employed to indicate various grades of an extraordinarily severe affection.

#### SCARLATINA MODIFICATA: IRREGULAR FORMS OF SCARLET FEVER

The above description of scarlet fever is intended to apply to such cases as preponderate and may be met with among sporadic outbreaks, and in the ordinary epidemics. In some instance, however, the disease departs from the types mentioned; and ~~this~~ is observed ~~xxxx~~ far more frequently in scarlet fever than in either small-pox or measles. Scarlatina may, still further, be regarded, both in its symptoms and course, as being the most irregular perhaps, of all specific infectious exanthemata, so that it becomes practically impossible to enumerate all the varieties of the disease which may present themselves in practice. The writer will, therefore, content himself with describing the most important modification of the disease, and those which are most likely to be encountered during the lifetime of ~~xxx~~ an ordinary practitioner.

##### (A) SCARLATINA SINE EXANTHEMATA.

This expression is regarded by many as justifiable only in those cases where several persons residing in the same locality, and exposed to similar epidemic influences, fall ill at the same time; some of them presenting, in a well-marked form, all the symptoms of scarlet fever; others suffering merely from fever and an affection of the throat, there being in these patients no eruption, nor, at a later period, any desquamation.

Some of the older writers, on the other hand, describe "rudimentary" and "mild" forms regarding every throat affection, during the time that a scarlatinal epidemic is prevailing, with suspicion, and prove the malady - in the ~~absence~~ absence of other confirmatory circumstances - to be scarlatinal from the subsequent occurrence of the characteristic desquamation, or by the appearance of a moderate dropsy with albuminuria. Hensch (Charité' Annalen - 111, Jahrgang, 1876, p. 553) believes



that scarlatina without eruption is of fairly common occurrence, but holds that the apparent absence of the exanthem is due to its scantiness or superficial erythematous character causing it to be either overlooked, or not being ~~be~~ recognized as specific, and that only a subsequent nephritis or a true desquamation renders the diagnosis in these cases positive. Difficulty of diagnosing such cases; which experience everywhere proves to occur, is as obvious as the desirability, from a prophylactic point of view, is urgent.

(B). SCARLATINA LAEVIS.

This term applies to the form of eruption seen in the ordinary simple form of the disease. The following varieties can be described;--

1. SCARLATINA LAEVIGATA.

This is a term applied by Constatt (Cited by ~~Mayr~~ Mayr- loc. cit.) to a more intense variety of scarlet fever, characterized by the shining appearance of the eruption, and by the mucous surfaces being affected in a more marked degree than usual.

2. SCARLATINA MILIARIS( (SCHARLACHFRIESEL).

This somewhat rare variety of the disease is characterized by the formation of whitish vesicles on a red base, and filled with a transparent fluid. They often cover large tracts of skin, but are observed principally on the trunk; in some cases, however, groups of similar vesicles are to be found in the inner surfaces of the arms and thighs, as well as on the neck, back, chest, and abdomen, to which the term "Miliaria alba" has been applied. Eichhorst (loc. cit. IV., p. 256) holds that profuse sweating is frequently productive of this form of eruption, and that it is due to an extensive exudation between the epidermis and the rete Malpighi. Cases are sometimes seen in which the vesicles become so large as to bear a close resemblance to herpes, pemphigus, or varicella.

3. SCARLATINA PAPULOSA.

In this rare form of Scarlatina, Small papules of a dark red colour - which give a rough feel to the skin, and are due to an inordinate swelling of the mouth of the hair-follicles - arise on the reddened surface of the parts affected. In some cases these papules are observed as early as from 12 to 18 hours before the ordinary scarlatinal exanthem makes its appearance.

#### 4. SCARLATINA HAEMORRHAGICA SEU SEPTICA.

In this type of the eruption, referred to under the variety of the disease, there are seen (instead of the minute dotted efflorescence disappearing beneath the pressure of the finger) reddish-brown points, in close proximity to one another and surrounded by a diffuse rash of a paler colour. These spots, being due to haemorrhage, are unaffected by pressure, which obliterates only the ordinary scarlatinal eruption between them. After a time they coalesce in places, the rash which surrounds them acquires a bluish ~~darkened~~ appearance, so that there are formed sharply defined patches, each as large as a half-crown, or even as the palm of the hand. Such must, of course be differentiated from those in which small isolated haemorrhages occur in the skin, but are of little consequence.

#### 5. SCARLATINA VARIEGATA ("RUBEOLA" SCARLATINOSA)

This form is marked by the red points, from which the eruption normally develops itself, enlarging so as to form defined maculae in size equal to a lentil or a bean, and of an intense red colour. These spots are found in large numbers on the limbs and trunk and in many instances simulate the exanthem of measles. As a rule, in these cases, every part of the surface is covered with a continuous and uniform, but paler, rash; and the intervals between the darker maculae are, consequently, never of the colour of healthy skin. After a time these darker spots sometimes coalesce, and so again produce a continuous eruption of a very deep hue; in other instances, however, they undergo no such change, but, throughout the whole course of the illness, present the same appearance as when they were first formed. Hensch (loc. cit.) maintains that the appearance of this form of eruption nearly always indicates an unfavourable course of the disease.

#### (C) SCARLATINA SINE FEBRE.

Cases are sometimes encountered of an extremely mild character, and in which, after a slight initiatory rise of temperature the disease pursues a typical course, except that the fever never exceeds 95.50 to 99°F. Wunderlich ("Das Verhalten der Eigenwärme in Krankheiten," Leipzig, 1870, - 330) denies that such cases like these ever occur (that is, without any fever), and emphasizes the difficulty of determining this point owing to such extremely mild cases seldom being seen at the outset of the attack. McCollom (loc. cit.) states that he had, in his series of 1000 cases,

37 in which 99°F. was never exceeded; Henoch (loc. cit.) had 4 in a series of 175. In some patients, though rarely, the temperature, after remaining elevated for a few days between 100° and 101°F., falls abruptly to normal and remains so throughout. Henoch has seen cases in which the temperature was of the "inverted type", that is, higher in the morning than in the evening.

#### (D). SCARLATINA SINE ANGINA.

This term has been applied to those cases of an unusually mild degree in which the angina is absent, or so trifling that it does not account for the existing fever. When present it lasts only for a few days, with the symptoms of a slight febricula. In these cases there is usually a certain amount of hyperaemia of the throat, and usually a faint enanthem can be seen, if the throat be examined at the onset of the disease, but no tonsillar enlargement. That the malady depends upon infection with the scarlatinal poison, it is important to note, can often be determined from the almost even though slight enlargement of the papillae at the tip and edges of the tongue; in addition to which, at other times, the diagnosis may perhaps be confirmed by a simultaneous enlargement of the cervical glands by a suspicious redness of the skin, a slight affection of the joints, albuminuria and other renal symptoms. The redness of the skin, however, is generally not sufficiently characteristic as to warrant a positive diagnosis; on the face it may be mistaken for an unusually marked flush from fever, in other parts for an accidental result of pressure, etc.; in many cases it is merely a scattered roseolous eruption, which looks like measles and lasts only a short time, sometimes merely a few hours.

#### SCARLATINA WITH OTHER DISEASES.

When scarlet fever occurs in the course of other diseases - which are then generally irregular - it frequently increases their severity, especially if the other affection ~~implicitly~~ implicate organs which are apt to be affected by the scarlatinal poison. Thus, for example, Löschner (Pr. Vjschr., 11. p. 1; 52. p. 31, ; 73, p. 150) regards the existence of a previous tuberculosis of the lymphatic glands as a very bad sign in scarlet fever, and believes that the more extensive this lesion is, the more violent will be the course of the disease, the more frequent its complications (meningitis, hydrocephalus, pleurisy, dropsy) and the more unfavorable its termination. On the other hand, other diseases which are indifferent to the scarlatinal poison not only do not change the character

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of the scarlet fever, or interfere with recovery, but they may even exercise a salutary influence. Batthez and Rilliet (loc. cit.) state that scarlatina has a favorable influence upon phthisis, a statement which is confirmed by Dilaters (Deut. klin., 1859, 12. 31.32, 35) but negatived by Hebra (loc. cit.) In this category some of the older writers have included the concurrence of scarlet fever with small-pox, measles, chicken-pox, and typhus, and mention the fact that death results only very rarely. In two cases of chorea seen by Thompson (loc. cit.) the disease disappeared when the children were attacked by scarlet fever; Loschner (loc. cit.) saw two cases, one of which recovered during scarlatina, in the other the disease was aggravated but suddenly disappeared. Lumbricoid worms are reported as being frequently discharged from the bowels during the scarlatinal illness, and some writers claim to have seen cases in which the worms have been passed into the stomach and vomited. Prevot (Schmidt's Jahr. 281. p. 1281) tells of a scrofula in a child being cured by a severe attack of scarlet fever. Betz. (Jour. f. Kinderh., 16. p. 386) observed an improvement in the stools of a case of dysentery when a diphtheritic colitis occurred as one of the symptoms of a complicating scarlatina; the ~~xxx~~ child eventually died.

It should be noted that the majority of authorities believe that in view of the specific nature of the poison scarlatina can never coexist with small-pox and measles in the same patient, and that cases of this kind, as mentioned above, must be referred to scarlatina variegata, or to the form of small-pox in which the eruption is preceded by an erythema. Experience, moreover, goes to prove that when an individual is attacked by two of these diseases in succession, either the progress of the first is checked, or the second fails to be developed. Noirrot (Histoire de la scarlatina, Paris, 1847) specially emphasizes the fact that when scarlatina and measles coexist, the former generally prevails; the latter (like small-pox under the same circumstances) being, as a rule, suspended for a time, but subsequently going through its regular course.

Purpura has been known to occur in combination with the scarlatinal rash in the haemorrhagic or septic variety of the disease; in certain cases it appears during the eruptive stage as an isolated symptom, and this form of it does not modify the force of the scarlatinal attack. Chronic eruptions, such as eczema, Psoriasis prurigo, or even severe scabies, do not prevent the occurrence of scarlatina. While the latter is present, however, they ~~recede~~ recede into the background, but return as soon as it has completed its course. The fact of the co-existence of the exanthemata occasioning one to be ~~coexistence of two exanthemata severe~~ coexistence of two exanthemata occasioning one to be

mild and the other severe has been well emphasized by  
Murchison ,(loc. cit.)

## C O M P L I C A T I O N S

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### THROAT

The severity of the angina may constitute a very serious complication, through the occurrence of deep ulcerations, and in such destructive processes the scarlatinous principle may reasonably be regarded as being aided by certain pathogenic micro-organisms. Sepcially referring to this, Jürgen-sen points out the fact of, in presence of our present ignorance of the exact nature of the scarlatinal poison, the impossibility of determining in how far the latter, unassociated with other pathogenic germs is responsible for the severe forms of necrotic inflammation, but believes that the scarlatinal poison itself is capable of occasioning such inflammatory reaction. The tendency to inflammation with necrosis arising from scarlatinal infection is still further emphasized by Henoch (loc. cit.) The researches of Loeffler (Deut. klin. Woch. Nos. 39, and 40., 1890), Bourges and Wurtz (Prog. Méd., May. 10, 1890), Bourges (Gaz. Hebdom., No. 13. 1891), and others at home and abroad, have dissipated the doubts which have so long existed as regards the causation of the Scarlatinal pseudo-membranous anginas, and established the absence of the Klebs-Loeffler bacillus in the vast majority of such early cases, and also that when it does exist it is in combination with the streptococcus pyogenes, seldom absent. Lemoine ("Rôle du Streptococque dans la Scarlatine et ses Complications" Bull. et Mém. de la Soc. des Hôp. de Paris, 1895, ibid. 1896, lll, S. Xlll, 303--319; Gaz. des Hôp. Dec. 24, 1893, p. 1449) states that in a series of 117 cases of scarlatinal angina, he found the streptococcus pyogenes alone in 93, the klebs - Loeffler bacillus as well in 5, the bacillus coli communis in 9 cases, the staphylococcus pyogenes aureus occasionally, rarely other pathogenic micro-organisms; from this, the fact of the streptococcus being almost entirely etiologic, is apparent.

Angina Pseudomembranosa of streptococcic Origin. In cases of this kind, characterized by severe or septic pharyngeal affections, a false membrane will be found in the pharynx, and upon the tonsils. As early as the second day the intensely inflamed and swollen tonsils will show scattered, irregular, patches of grayish-white exudate to a greater or less extent enveloping them, and the pharyngeal mucous membrane will be seen at this time



to be severely congested and of a brilliant colour. The lesion is located to one or both tonsils - the latter being the commoner finding. The lymphatic glands beneath the angle of the lower jaw are appreciably enlarged and tender. It is no uncommon thing to find the local lesion restricted to the irregular patches of exudate mentioned, or, occasionally to observe small, but less destructive foci upon the soft palate. Resolution, where the throat lesions are as mild as this, usually begins at the fifth or sixth day, and the patient makes a slow, but uninterrupted recovery.

Often, however, when the general aspect of the disease is severe, the grade of pharyngeal inflammation is extreme from the very outset; so that by the second day, the tonsils are most severely inflamed, enormously swollen, and the false membranes covering them spreads rapidly over the mucous lining of the hinder part of the cheeks, the hard palate, and posterior pharyngeal wall, sometimes, indeed, up the eustachian tube to the middle ear, and the posterior nares as well. In addition to this, the secretions of the mouth (which are markedly increased) may be blood-stained; the breath has a particularly offensive odour; the lymphatic glands draining the parts concerned -- more especially the submaxillary -- are vastly swollen and tender; coryza is very pronounced should the posterior nasal apertures be involved, and with this there is an acid, sero-purulent, blood-stained nasal discharge, occasioning scalding swelling and rhagades wherever it impinges the neighbourhood. The false membrane varies in colour from a gray to a green, or black, and wherever it extends gives rise to a destructive necrosis, the detritus of which, falling into the larynx produces a peculiar distressing cough, the general discomfort of the patient being likewise aggravated by the constant necessity for mouth-breathing which the occlusion of the nostrils occasions. The affection of the neighbouring lymphatic glands may be much more severe than already noted so rendering the neck immovable, the same also being at times occasioned by a general cellulitis of the neck. The general condition of the patient may - especially when seen early before the appearance of the eruption - be undistinguishable from that of a severe septicæmia, so great may be the rapidity and weakness of the pulse, the height of the temperature, and the profundity of the constitutional depression.

#### ANGINA GANGRENOSA

The local lesion has, in rare instances, however, been observed to assume a definite

gangrenous tendency but only in the gravest kind of scarlet fever. Besides the tonsils, the faucial pillars, the ~~uvula~~ and the deep cervical fascia, have been seen to ~~be the~~ implicated. The tonsillar exudate in these cases is of a grayish-black colour, and spreads to the neighbouring parts with remarkable rapidity, and deep ulcerative, bleeding, and sloughing areas remain after the separation of the necrotic tissue. The tonsils - always enormously swollen - have been known to slough off; and the soft palate to be perforated. In rare cases the pus had been found burrowing down the neck as far as the thorax (its course being limited in certain directions by the attachments of the cervical fasciae); the pharynx has been broken into so that food comes out through the external opening, in addition to which it is possible to have, resulting from suppuration, retro-pharyngeal abscess, erosion of the large vessels of the neck, as well as of the carotid and smaller arteries, and consequent fatal haemorrhage, and, lastly, destruction of important muscles and nerves. Still further, however, the gangrene may produce subcutaneous emphysema; by destruction of the skin the deeper parts are laid bare to a great extent, and septic infection often results. With any extended destruction of the tissues, death (owing to the slight tendency of the tissues to repair) is almost inevitable; it ensues sometimes quickly, sometimes more gradually from progressive toxæmia, and exhaustion.

#### ANGINA SCARLATINOSA MEMBRANOSA OF TRUE DIPHTHERITIC ORIGIN

It is but seldom that true diphtheria is seen as an early complication; it nearly always occurs late in the disease after the anginal affection has subsided, is due to secondary infection with the Klebs-Loeffler bacillus, its general course is practically identical with that seen in the early pseudomembranous form, and is to be regarded as essentially a true diphtheria complicating scarlet fever. The appearances found may not be at first sight distinguishable from those following infection with the streptococcus pyogenes, but little diagnosis confusion arises when it is remembered that true diphtheria manifests a much greater tendency to invade the larynx and trachea and is often followed by the characteristic paralysis. It is only in the most exceptional instances that an early angina of streptococcic origin, associated with necrosis of the pharynx, is followed by paralysis.

So good an observer as Henoch (loc. cit.) states that he has never seen acute -motor paralysis or palatal paralysis following a scarlatinal angina, except in those cases complicated by a true diphtheria.

#### E A R

Otitis media, consequent upon extension of the throat affection up the Eustachian tube, is regarded as the commonest complication of scarlet fever. The ear may be involved, however, by extension upwards of the local inflammation of the skin, the external ear and membrane tympani becoming affected. This occurrence is far less common ~~than~~ than that mentioned.

The frequency of middle-ear trouble - the dangers of which, though perhaps greatly exaggerated by aurists, are nevertheless real - appears to vary according to the age of the patient and the severity of the prevailing epidemic; it is certainly commonest in very young children, and it is the opinion of most observers that the liability to it diminishes with <sup>the</sup> year of the child's life. Bader and Guinon (Cited by Moizerd, Art. "Scarlatine" in *Traite' des Mal. de l'Enfance*; Paris, 1897, vol. 1. p. 143) hold that the mild or catarrhal form of otitis media occurs in 33 per cent. of all cases of scarlet fever, the purulent form in only 4.5. per cent. Caiger believes otorrhoea to occur in 11.15 per cent., and bases his statement on an analysis of 4015 cases of scarlet fever. Holt (Diseases of Infancy and Childhood, ~~Maxx~~ N.Y., 1897, p. 101) expresses the opinion of most in stating that it is more frequent in cases accompanied by severe throat symptoms; in 75 per cent. of such is his estimate. It usually develops in cases accompanied by pharyngeal lesion, about the end of the first week, seldom before that, and spreads from one to the other ear. As the complication develops at the height of the fever attention may not be drawn to its existence until the occurrence of otorrhoea, but it is often suggested by the crying of the child and its frequent application of the hand to the affected region. In older children the absence of pain may cause the accompanying deafness to be overlooked unless a rise of temperature lead to special investigation.

When the affection has travelled from the throat the lumen of the Eustachian tube will be inflamed, and so swollen perhaps as to be occluded, and its secretions and contents retained, such, moreover, markedly aggravating the local symptoms. The later, at an early stage of the attack, comprise pain in the affected ear, tenderness about the region of the external auditory canal, some special rise of temperature, or a maintenance of the existing curve,



and marked enlargement, tenderness and swelling of the glands in the neighbourhood of the affected organ. After a few days of such suffering, unless relieved by incision, the membrana tympani burst of its own accord, with the result that an immediate improvement in the patient's condition occurs, the pain and tenderness disappearing, and the temperature subsiding forthwith. In less severe cases the rupture or incision of the membrana tympani is followed by its rapid healing, after a few weeks of otorrhoea, and no deafness remains.

Purulent (or suppurative) otitis media is, however, a much more serious condition than that just described, and permanent deafness is the usual result. The complication occurs in severe varieties of scarlet fever associated with intense angina. The clinical picture resembles that of the simple otitis media, with the addition of an irregular and markedly elevated temperature. Examination of the membrana tympani suggests the condition: it is swollen, cloudy and yellowish-red, its blood-vessels are markedly injected: its edges cannot be sharply defined; the handle of the malleus is indistinct, and the tissues of the external auditory canal are swollen and injected. Unless relieved, perforation occurs, as in the other variety, spontaneously. In very severe cases, however, permanent deafness results, and an associated chronic otorrhoea may have serious and far-reaching consequences. The actual local lesions produced by suppurative otitis media vary from a partial destruction of the membrana tympani to a complete loss of that structure, together with perhaps destruction of one or both bones of the tympanic cavity, and extensive ulceration, or even necrosis of the tympanum. Such serious affections as inflammation of the mastoid cells, paralysis of the seventh cranial nerve, thrombosis of the lateral or other Sinus, or even abscess of the brain, may follow the chronic otorrhoea. Burckhardt - Merian ("Ueber den Scharlach in Seinen Beziehungen zum Gehororgan" -- Von Colkmann's Klinisch. Vortr., No. 182; Chirurgie, No. 54, p. 1489) states that he found 84 per cent. (72 cases out of 85) of scarlatina ear disease to be double, and among 4309 cases of acquired deafness, 44 (1.03 percent) were due to scarlet fever.

In a few cases empyema of the mastoid antrum may be engendered in a chronic suppurative otitis media. With the establishment of a passage between the tympanum and the mastoid cells, <sup>the discharge</sup> is observed to diminish somewhat; in addition to which, in this complication, the temperature becomes elevated (104°F. or more) and irregular; pain and tenderness exist over the mastoid region;

rigors may be experienced; the pulse is rapid or irregular; and the patient is usually restless and irritable. Unless relieved by operation these cases often die from subsequent meningitis.

In some cases, either from a periostitis or a local adenitis an inflammatory swelling may form behind the external ear over the mastoid, this being associated with a rise of temperature, tenderness, and, in certain instances, oedema of the eyelids on the same side, with more or less projection forwards of the ear, in rare cases, moreover, attended by local abscess - formation. The condition may be remotely dependent upon the middle-ear inflammation.

### LYMPHATICS.

Marked and ~~early~~ enlargement of the cervical lymphatic glands is a fairly constant accompaniment of the scarlatinous attack: according to Schamberg "A Clinical study of the Lymphatic glands in One Hundred Cases of Scarlet Fever" - *Annals of Gyn. and Pediatrics*, December, 1889, vol. XIII. p. 39) swelling of the maxillary and submaxillary glands occurs in 96 and 36 per cent. respectively, of all cases of scarlet fever, and the posterior cervical - but to a lesser and unimportant degree - in 77 per cent. In patients suffering from a moderately severe attack of scarlet fever the enlargement of the lymphatic glands is never very great, and when present soon resolves with the establishment of convalescence. In more severe forms of scarlatina, however, especially when the pharyngeal involvement is early and extreme, the lymphatic glands in the neighbourhood of the throat may be enormously enlarged so as even to fix the head. The submaxillary and maxillary glands have sometimes been seen to proceed to phlegmonous inflammation (after a more or less persistence in the condition described) and suppuration. Involvement of the parotid gland has been known also to occur.

### PHLEGMONOUS INFLAMMATION.

Unless the maxillary and submaxillary abscess be surgically treated haemorrhages may occur from the large cervical blood-vessels, but, even when opened and drained, the pus may burrow in various dangerous directions; or again, instead of this, with or after, the suppurative process, a rapid and diffuse and deeply infiltrating cellulitis of the neck may occur.

### ANGINA LUDOVICI.

This complication - which is also known by the name of "Tippet Neck" -- may occur at the fifth day of scarlet fever, though it usually develops about the beginning of the second week. The skin is glossy, tense, and sometimes pits on pressure, but does not fluctuate, and the

affection may be limited to the angle of the jaw or invade the entire neck so as to render any movement of the head impossible. Death almost invariably results, from rupture of a large vein or artery, or cerebral embolism and thrombosis.

That the scarlatinal poison can, and often does, affect all the lymphoid structures of the body is a fact clearly established by post-mortem evidence.

The enlargement of the spleen can be felt during life and is sometimes double of the normal, or more than that if secondarily affected.

Secondary to the suppuration of the cervical glands, and even destruction of the entire eye, erosions into the large vessels of the neck, thrombi in the veins, openings into the pharynx, and retro-pharyngeal abscesses, may occur. Of the last mentioned Bokai ("Ueber Retropharyngeal-abscess bei Kindern"-- Jahr. f. Kinderh., N.F., vol. X. pp. 108 et seq.) has reported six cases, as a result of lymphadenitis, out of 664 cases of scarlet fever. In a series of 100 cases studied by Schamberg (loc. cit.) the lymphatic glands were enlarged in the following proportions;-

Inguinal glands	...	100	per cent
Axillary	...	96	"
Maxillary	...	95	"
Posterior Cervical	...	77	"
Anterior Cervical	...	44	"
Submaxillary	...	36	"
Epitrochlear	...	26	"
Sublingual	...	25	"

The maxillary glands were found to attain the largest size, and also most frequently to be suppurative. In no case were the glands unaffected on the second day of the disease.

#### JOINTS.

Acute articular rheumatism is more often a sequel than a complication of scarlet fever, and differs in no way from the disease otherwise produced. Rheumatic cases usually relapse when attacked by scarlatina.

SCARLATINAL SYNOVITIS ("Scarlatinal rheumatism", or "pseudo-rheumatism") is a very common complication of the scarlatinal attack. It varies, however, in frequency, according to the character of the epidemic. Thus, Ashby (Brit. Med. Jour., 1883, vol 11. p. 514) reports, in a series of 3000 cases of scarlatina 4 cases, two of which Hodger (Cited by Eichhorst, loc. cit. p. 24) observed it in 117 out of a series of 3000 cases of scarlet fever, that is, in 3.9 per cent. In the opinion of most authorities this affection differs from true articular rheumatism in that it shows less tendency to migrate



from joint to joint; it involves fewer joints; the characteristic acid sweats of true rheumatism are absent; relapses are less frequent; and the cardiac complications seem in the case of true articular rheumatism are absent. It is, therefore, an independent pseudo-rheumatic affection. It occurs in two distinct forms: in both, the streptococcus pyogenes has been found in pure culture.

1. SIMPLE CATARRHAL, OR SEROUS SYNOVITIS.

According to Holt (loc. cit. p. 902) this variety is seen more often in adults than in infants and children, and increases in frequency after the fifth year, occurring but seldom under the age of three. It attacks by preference the smaller joints-- especially of the hand, wrists, ankles and feet -- but has sometimes been observed in the large ones. It may, indeed, attack any articulation (even those of the cervical vertebrae, leading to muscular contractures), and is usually seen to occur at the end of the first, or beginning of the second, week - rarely late in the second or third week of the scarlatinous attack. In the mildest cases the symptoms comprise such discomforts as: indefinite pains in the joints, swelling, impeded movements, redness, and pyrexia, lasting for 3 to 4 days, thereafter entirely disappearing. In the more rare cases, the symptoms described are greatly intensified and the constitutional depression is marked.

According to Jurgensen (loc. cit. p. 181) the larger joints, such as the shoulder and knee, may ~~remain~~ retain their serous effusion and remain swollen for weeks, but the constant uniformity of the synovitis, which persists steadily while the attack lasts, and shows no fluctuation as is seen in true articular rheumatism, is peculiarly characteristic of the malady when of scarlatinal origin.

2. SUPPURATIVE, OR PURULENT SYNOVITIS.

This rare complication of scarlet fever usually occurs late in the disease and affects the larger joints only. According to Henoch (loc. cit.) it may arise either through the local development of suppuration in the inflamed joint, - the least frequent form - remaining, in these cases, limited to a single joint; or as the result of emboli, following septicaemia, - the commonest source of the latter being the ulcerative and necrotic processes in the pharynx,-- involving a number of joints and invariably ending in death. Bokai ("Ueber die scarlatinosen gelenk," Jahr. f. kinderh., N.F. vol. XXIII, 1885, p. 304 et seq.) has reported the occurrence of a chronic arthritis ("white swelling") after scarlatina, in addition to a secondary

tuberculous infection. Abscesses have been known to develop around the larger joints, into which they exhibit a marked tendency to break. Richardière and Peron (Gaz. des Hôp., Paris, Dec. 5, 1893), p. 1318) report the occurrence of ankylosis of the ankles, knee, elbow, and finger, leading to deformity.

### K I D N E Y S.

No other complication of scarlet fever can equal nephritis in importance or interest, and this condition always gives rise to anxiety in otherwise mild and hopeful cases.

The poison of scarlet fever, when affecting the kidneys, does so in one of three ways;--  
1. TRANSIENT FEBRILE ALBUMINURIA, and Initial Catarrhal nephritis. During the length of the fever there is commonly a transient albuminurea (in 76.6 to 92 per cent. of all cases, according to Eichhorst-loc. cit. p. 239), and it is possible for the kidneys to escape without greater damage than occurs in other acute febrile affections, for it does not depend upon any anatomic alteration in the kidneys. It appears about the second day and lasts three or or four days, subsiding with the fever.

In cases of moderate severity and during the first week, initial catarrhal or degenerative nephritis occurs. Besides albumin, the urine is found to contain mucous cylindroids, and degenerated epithelial cells, sometimes - but rarely - epithelial or hyaline casts, and perhaps a few blood corpuscles. Friedlander (Fortschr. der. Med. 1883, vol. 1, p. 81) states that he has now and then seen oedema to occur in these cases. This catarrhal condition of the renal tubules is usually seen about the time that the eruption begins to appear, and usually disappears altogether during the second week unless the mild degree of the catarrhal or degenerative alteration should continue and pass into a post-scarlatinal nephritis. The possibility of some anatomical alteration proceeding without casts, etc., being found in the urine, should ~~not~~ not be disregarded.

2. SEPTIC NEPHRITIS. In severe forms of scarlet fever, when the throat affection comprises sloughing of the tonsils, involvement of the soft palate, and general adenitis, the urine quickly becomes loaded with albumin, but shows scarcely any blood, and but few casts. Renal symptoms are not usually noticeable, and if present they will be masked by the general septicaemic condition. There may be neither dropsy nor uraemia, and the

patient usually dies by the end of the second week, when a typical pyaemic kidney is found containing minute abscesses. This condition of the kidney is only one part of the general pyaemia and illustrates the participation of this organ in the general infection.

3. POST-SCARLATINAL NEPHRITIS. The occurrence of post-scarlatinal nephritis, by which term is meant a nephritis developing after the subsidence of the acute symptoms of the disease, and is usually noted about the third or fourth week. It is an acknowledged fact that the kidneys are involved in an active sympathetic inflammation, and at the end of the fever, more than at the beginning, are occupied in carrying off waste products of the fever itself. From the nature of the scarlatinal attack they are in an irritable condition and prove to undergo inflammatory changes, in the same way that the bronchial tubes and the lungs are left in a very susceptible condition following measles, etc. In this manner the uriniferous tubules become choked up by the shedding of epithelium that is going on inside. The number of cases that suffer from this post-scarlatinal nephritis varies according to social conditions, the nature of the epidemic, the season of the year, the nature of the treatment during the disease, and especially the care bestowed upon the patient during convalescence. In Friedlanders series it was present in 18 per cent. Cadet de Gassicourt (cited by Moizard, loc. cit., p. 148) has reported a late scarlatinal nephritis in 30 per cent. of all cases. Ashby and Wright (Diseases of children, N.Y., 1896, p. 365) find that, on an average, 6 per cent. of hospital cases develop a post-scarlatinal nephritis. Caiger (loc. cit., p. 156), in a series of 2078 cases gives the frequency as 3.32 per cent. The usual time for this form of nephritis to occur is from the end of the second to the beginning of the fourth week, and it usually sets in very gradually. Traces of albumin may be found for a few days before the blood and larger quantities of albumin occur, but it is often impossible to date the commencement of an attack. Usually after the fever has subsided the patient for a few days feels well, but suddenly grows restless, is feverish at night, is thirsty, has a quick hard pulse, and passes a small quantity of darkish urine. Usually the latter will have been observed to be diminishing for several days, and a slight puffiness about the face frequently announces the beginning of the trouble. Later the face becomes pale and puffy, while there may be oedema of the feet and scrotum, and some vomiting. Under favorable circumstances improvement may take



place; large quantities of urine may be passed, and the patient convalesce. The nephritis symptoms may, however, deepen until uraemia appears, the pulse becoming slow, the temperature subnormal, and the tongue dry and brown. Vomiting is now a frequent occurrence, diarrhoea is not unusual; epistax is and haemorrhages from various mucous surfaces, and muscular twitchings may be noted, and general convulsions may terminate the case, though it is more commonly the result of cardiac failure. Cases which survive have been observed to develop maniacal attacks, melancholia, aphasia, and amaurosis.

Next to uraemia as regards the risk of fatality is anasarca, which is of the kind usually observed in renal disease. While present, the desquamation seems to be suspended in consequence of the saturation of the layers of the epidermis, with fluid, but when the swelling has completely subsided, the cuticle again begins to peel off, being apparently enabled to do so by the removal of the tension caused by the serous effusion. Effusion into the serous cavities is seen more commonly as ascites, following usually a marked oedema into the skin and subcutaneous connecting tissue. Hydrothorax is observed less frequently than the foregoing, and its course is often remarkably rapid. Hydropericardium very rarely occurs by itself, being usually a participant in a general dropsy.

Oedema of the lungs is usually observed in association with a general anasarca, particularly with hydrothorax. Oedema of the glottis often coexists with oedema of the lungs. Oedema of the pia mater and brain substance is met with only in cases of prolonged general dropsy, in which, indeed, it seldom fails to occur: it sometimes, however, appears to develop rapidly, with the usual cerebral symptoms. Dropsy of the Cerebral ventricles is met with only under the most exceptional circumstances.

#### H E A R T

The heart appears to exhibit a marked susceptibility to the scarlatinal poison, hence the tachycardia, with the small, rapid, and even irregular pulse, seem to be ~~marking~~ the outset of the disease and before the appearance of the eruption. Later the sounds may become altered, the first being soft and valvular; or the two may run together so as to assume a unanimity: in rare cases bradycardia may be observed; and, rarer still, acute dilatation may be appreciable. According to Romberg ("Ueber die Erkr. des Herzmuskels bei Typhus abdominalis,

Scharlachs, und Diphtherie" - Deut. Arch. f. klin. Med., vol. XLVIII, 1891, pp 369 et seq. <sup>Results</sup> from a mild form of myocarditis induced by the circulating toxin. Even in uncomplicated scarlatina endocarditis or pericarditis may occur, with or without definite physical signs. The mitral valve is more often than any other likely to be attacked by the endocarditis, than which, however, myocarditis is much more common. The heart is nearly always enlarged (dilatation and hypertrophy), especially in children, during an attack of scarlatinal nephritis. Most frequently the lesion is left-sided, sometimes both. This dilatation, occurring as a result of increased vascular tension, produces the ordinary symptoms, for example, tachycardia, tachypnoea, with which there is diminished arterial tension, and rapidity of the pulse. This enlargement of the heart is very apt to be overlooked unless carefully percussed for, or in severe cases when it is obvious. Ashby ("Abstract of a Lecture on the Connection between Scarlet Fever and Heart Disease"-- Lancet, 1, 1886) states that in 900 cases of scarlet fever he not uncommonly found

pericarditis, <sup>and also</sup> endocarditis with rheumatic affections, <sup>which</sup> at the end of the third or beginning of the fourth week. In over 100 autopsies he saw endo- or pericarditis without nephritis. In most cases the myocardium was pale and flabby and the endocardium upon the papillary muscle was cloudy. In no case did he find a hard and leathery myocardium after scarlet fever; and he considers it probable that in most cases of nephritis dilatation of the left side of the heart occurs and lasts for at least a week. In pyaemic cases, endo- and pericarditis are common. Hodger (cited by Eichhorst, loc. cit. p. 241) found endocardial and pericardial inflammation in 32 per cent. of all cases of septic infection.

## L U N G S

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A mild form of bronchitis may develop early in the course of scarlet fever, or again, a broncho-pneumonia, and quite apart from the pharyngeal and laryngeal lesions described. Hensch (loc. cit., p. 680) has emphasized the great frequency of the early bronchial or pulmonary affection, the same being often masked by other symptoms, and overlooked. Bronchitis and broncho-pneumonia may, however, occur by direct extension of the pharyngeal lesion downwards, from aspiration of septic material, or again, as part of a septicaemia. Ordinary lobar pneumonia whilst occasionally occurring in the course of the ordinary illness of scarlatina

most usually does so in the presence of nephritis.

#### P L E U R A .

Among the serous inflammations which complicate or follow scarlet fever, pleurisy is one of the most important clinically. It usually begins in the desquamative stage; is apt to be suppurative, on account of the feeble state of the patient when it commences; and may or may not be accompanied by effusion, which, however, when present, almost constantly becomes purulent as a result of a secondary infection. It is nearly always very tedious, as all empyemas are and it does not differ in its clinical history from the idiopathic disease. Unless operated on, these cases usually die: pus has however been known to break out into a bronchus and the patient recover in that way. In simple scarlet fever involvement of the fever is first seen during the second week of the disease and is unilateral.

#### N E R V O U S   S Y S T E M .

Severe cerebral and spinal disturbances often complicate scarlatina, especially when the disease runs a severe course, or whenever there are other serious complications. Severe nervous symptoms are due to various causes: to the toxic action of the scarlatinal poison; to the high fever; to the extensive cellulitis of the neck interfering with the circulation of the blood; and in the later stages of the disease to the anaemia produced by the severity of the illness; and also to the effects of uraemia. The post-mortem examination usually - but not always - reveals hyperaemia, slight inflammations of the nervous tissue, oedema, anaemia, serous effusion into the ventricles, and perhaps abscesses and extravasations. In some cases it is impossible at any stage of the disease to refer the symptoms to any cause, as they give only the most doubtful indications of the nature of the nerve lesions. This difficulty of estimation is even more obvious when it is remembered that each symptom may depend upon a great variety of lesions. The nervous disturbances appear at various periods of the disease: at the outset, and then generally in connection with other symptoms, as an indication of toxæmia and of the severity of the fever (headache, coma, or delirium), perhaps suddenly, in the midst of an otherwise favorably progressing case, cerebral symptoms may arise, as a result of irritation of the brain; also when the eruption, fever, and angina are rapidly increasing in intensity, in the form of febrile delirium and stupor, increased or modified by the continuance of the poisoning; also coincidentally with the sudden disappearance of the eruption, and then especially in the form of convulsions during the course of a nephritis or uraemia, in the same



way as when there is no scarlatina, in fact at any time whenever pathological changes occur in the nervous system, from any cause whatsoever arising.

#### EYES.

Mild affections of the eye, particularly slight conjunctivitis, with epiphora and photophobia, are not infrequently encountered at the outset of severe scarlet fever, coincident with an abundant eruption on the face, but never to the same degree as in measles. On the other hand, the later occurring ophthalmia, not infrequently met with in scrofulous persons, is generally very obstinate, and often leads to great corneal affection and even panophthalmitis, with severe and even permanent impairment of vision. The same symptoms may result from an intense coryza travelling up through the lachrymal duct, and thus giving rise to lachrymal fistula and other more or less severe affections of the tear passages. Primary keratitis occasions frequently perforation of the cornea, with its serious consequences. From the scarlatinal nephritis a special form of retinitis arises which often develops itself within a few days, sometimes in a longer time, with various degrees of visual impairment. It occurs generally in both eyes, but not always at the same time nor in the same degree, and, as a rule, total blindness does not ensue. The course of the affection is generally always protracted, but the prognosis is generally favorable, more or less complete restoration of vision being the usual result. Less frequently the impairment of vision is due either to atrophy or to retinal detachment. The transitory blindness which accompanies uraemia, in connection with other symptoms, occurs independently of the presence or absence of any retinal affection and is, therefore, of a different nature. It shows itself usually as a binocular amblyopia, which proceeds in a day or two to complete loss of perception of light: not infrequently on awakening from an unconscious condition the patient finds himself quite blind. The pupils are abnormally dilated, they usually still react to light, but less frequently are fixed and motionless. The amaurosis disappears as rapidly as it occurred, and generally in from two to four days vision is completely restored.

#### GASTRO-INTESTINAL TRACT.

In young children especially and early in the course of the disease, a more or less severe stomatitis may occur, accompanied by increased salivation, ulceration of the mucous membrane of the mouth and cheeks, perhaps haemorrhages,

great pain and consequent interference with masticatory movements. In rare cases ~~masticatory~~ noma follows, in consequence of which the tongue and cheek may show extensive sloughs.

Vomiting is a constant associate of the invasion of the disease and its concomitants. Occurring later it indicates nephritis, uraemia, or one of the complications already described.

Diarrhoea is common enough and an early symptom even in typical cases of scarlatina. It is, however, at times so severe as to be an actual complication, and gives the case a marked resemblance to enteric fever.

The scarlatinal inflammations of the intestinal tract have been classified by Litten (Charité' Annalen, vol. 11. pp. 128 et seq.) into three groups.

1. Simple catarrhal enteritis, of a mild character and short duration.

11. Dysentery, with tenesmus and bloody, purulent evacuations.

111. The diarrhoeas of typhoidal character with loose, watery motions, associated with severe tympanitis, and great liability to fatal haemorrhages, and characterized with typhoidal symptoms.

#### L I V E R;

An enlargement of the liver, at the time of the acme of the eruption from congestion, is sometimes observed. Wunderlich, (loc. cit.) has, however, seen it smaller than normal: in one fatal case its weight did not exceed two pounds. Jaundice may result from alterations in the liver, but is most noticeable, of course, after the disappearance of the eruption. In severe epidemics icterus has been reported by Santlus (Jahr. f. kinderh., 22. pp. 300, 302) and others as a frequent complication, in many cases a fatal one. Danielssen (V.- H. Jbr., 1868 11. p. 255) states that at the autopsy of a case of malignant jaundice, - a girl, aged 20.- he observed fatty degeneration of the liver, spleen, kidneys, heart, and considerable ecchymosis of the lungs and kidneys. Hepatic lesions appear, however, to be of rare occurrence. According to Baginsky ("Die Kinderkr.," Berlin, 1899, p. 117.) the development of acute destructive changes in the liver, coincident with or during the existence of a nephritis is particularly to be dreaded, in that it predisposes to uraemia.

#### S P L E E N.

Enlargement of the spleen - common during the acute stage of the fever - can only be regarded as a complication in those rare cases in which it proceeds to softening: the symptoms are not characteristic.

## S K I N

In the irregular forms of scarlatina local lesions ~~for~~ of the skin - of septic origin - may assume an intensity as to render them worthy to be regarded as complications.

Exceptionally the desquamations may be so deep as to leave raw surfaces , or again, the nails may drop off.

Parts subjected to constant pressure may develop a decubitus; and in rare instances boils or multiple abscesses may be developed.

Gangrene may involve other parts of the body besides the neck; for instance, the genitals and perinaeum, the face, from diseases of the eyelids, the eye, ear, nose, etc.

Erysipelas; eczema of the face, ears, and head; urticaria; and pemphigus have been reported by different observers.

## V E I N S.

Moizard and Ulmann ("La Phlebite Scarlatineuse"-- Arch. de Med. des Enfants , vol. 11. No. 10. 1899, p. 601) have drawn attention to the occurrence of phlebitis- a rare complication-- in one case, affecting the right axillary and humeral veins; and mention four other cases encountered by them during a search of the literature. These observers found the phlebitis to be due to a streptococcic septicæmia, and regard it as likely to occur in very severe cases of scarlatina only and at any time from the fourth to the fifteenth day.

## S E Q U E L A E.

In the same way that scarlatinal complications are often but exaggerated symptoms, so the sequelae are ~~not~~ infrequently merely the result of aggravated complications.

Scarlet fever is sometimes followed, especially



under unfavourable surroundings conditions, by anaemia, cachexia, and susceptibility to various slight affections, such as local oedemas, which are generally unimportant, but sometimes more extensive and recurrent, the latter happening being observed by Welsch (Bay. Intell., 1874, p. 26) in one case every eight days for twenty years. The oedema is occasionally diffused and firmer than usual. A scarlatinous patient may also suffer from miliary eruptions, boils, abscesses, glandular enlargements, neuralgias, dyspepsia, and colic, as after other serious diseases. Complications occurring during the course of scarlet fever may give rise to various sequelae. The following are the most important conditions following ulceration of the skin; disease of the lymphatic glands, cellular tissue, bones and joints (intense articular pain, torticollis from inflammation of the cervical vertebrae, caries of the vertebrae with subsequent kyphosis, chronic purulent synovitis with formation of fistulae, luxation, etc.) intestines (chronic diarrhoea, prolapsus ani in young children), the pharynx, air-passages, and genitals; sometimes also alopecia, various skin diseases, enlarged tonsils, chronic nephritis (which, according to Weber (loc. cit.), may be found even in cases where no such disease existed during the scarlet fever: this is highly questionable, for scarlatinal nephritis may run its course for a long time without producing any symptoms); hepatic and splenic affections, peritonitis, cardiac valvular disease, venous thrombosis, vesical calculus; likewise affections of the respiratory organs, such as chronic laryngitis, following oedema glottidis, ulceration, etc., enlargement of the bronchial glands, pneumonia, and pleurisy. Among very important sequelae are affections of the organs of special sense. In many cases hearing is permanently impaired, in consequence of adhesions, rigidity, or even destruction of the auditory mechanism; or chronic purulent otitis or caries of the neighbouring bones may threaten life. Disturbances of vision may appear from two to six weeks after the scarlatinous attack, result from paralysis of the muscles of accommodation and are always binocular and usually unassociated with mydriasis. These diseases of accommodation may cause convergent strabismus. The external muscles of the eye are rarely paralysed. Frequently nervous disease are noted as sequels of scarlet fever: motor lesions: such as chorea after rheumatism with or without cardiac disease hemiplegia, spinal and cerebral paraplegia, spasmodic contractions (of the trapezius and sterno-mastoids;) paralysis of single nerves (the facial with or without disease of the petrous temporal, the nerves of special sense, etc)

general hyperaesthesia of the whole body (with the exception of the face and scalp), or hyperaesthesia or anaesthesia in various parts, different forms of neuralgia; hysteria and epilepsy, alalia, aphasia, and alexia, melancholia, mania, and other chronic mental derangements, especially in adults.

## D I A G N O S I S

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In a typical case of scarlet fever the diagnosis is not as a rule, difficult, and can usually be made from such diagnostic signs as these: the existence of a special eruption; its mode of spreading over the surface of the skin; the inflamed state of the throat, pharynx and mouth, the peculiar desquamation, ~~the~~ <sup>spreading</sup> of the disease by contagion, the epidemic occurrence; the febrile symptoms which accompany it; and, finally, the complications and sequelae to which it may give rise. It is as well, however, to remember that often many of these characters may be absent, and then the diagnosis becomes difficult, and the case must then be watched, until it has passed into the stage of desquamation. It sometimes moreover, is of material assistance to bear in mind the fact that the period of incubation is short in comparison with that of any other exanthemata, particularly measles, smallpox and varicella. Vomiting, associated with high fever, would also exclude the other eruptive diseases. The pulse itself is highly suggestive, being quick, hard, and wiry, and often at a rate of 140 to 150 per minute. The early sore throat and the intense hyperaemia of the whole mucous membrane in that neighbourhood, associated with marked constitutional symptoms, make it easy to differentiate from measles, varicella and small pox. The punctate eruption of scarlet fever is not found in any of the other eruptive diseases. Bacteriologic examination is also helpful in doubtful cases.

## DIFFERENTIAL DIAGNOSIS.

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### ERYTHEMA.

Erythema frequently bears a striking resemblance to the exanthem of scarlatina, but it is generally unattended with fever, and any febrile symptoms which may be present are due to some other disease. It is, moreover, very irregular in its mode of invasion, in its distribution over the cutaneous surface and in its duration; its various stages occupy but a very short space of time, and it is not followed by desquamation, and it is not contagious.

### DRUG ERUPTIONS.

Quinine, belladonna, iodide of potassium, copaiba, chloral, antipyrin, and certain food - stuffs (lobsters and crabs) may cause an intense erythematous eruption almost identical with that of scarlatina, but the sudden onset and rapid pulse and other characteristic symptoms of scarlet fever are lacking, and the temperature



unless disturbed by some more or less obvious cause-  
is normal.

### M E A S L E S.

The destructive points between scarlet fever and measles can best be displayed in tabular form as follows:-

<u>Measles</u>	<u>Scarlet fever</u>
(1) Incubation long: lasts about two weeks	(1) Incubation very short, at the longest 5 to 7 days.
(2) Period of Invasion about <sup>3 days</sup>	(2) Usually 24 hours.
(3) Masked catarrhal symptoms.	(3) Catarrhal symptoms absent in ordinary cases.
(4) Maximum temperature at the beginning of the period of invasion, second day lower, third day also low.	(4) Temperature steadily increases as the period of invasion continues. glands swollen at end.
(5) Enanthem, in the form of papules, appears upon the anterior pillars of the fances and soft palate; bluish color of the mucous membrane of the mouth as well as of the tongue, becoming more marked as the period of invasion develops.	(5) Enanthem, appears upon the soft palate and the posterior pillars of the fances, is red, not discrete, confluent; Tongue coated and red papillae prominent; pulse higher than accounted for by the temperature.
(6) Eruption of measles appears upon the face; attains its maximum development in from 3 to 4 days, from above downwards; and is always of a more or less bluish tint with much swelling, discrete, and of circular outlines.	(6) Eruption appears upon the chest (face free or flushed), attains its maximum development in from 5 to 6 days, is of a bright scarlet color, confluent, red, with slight elevations at the openings of the glands.
(7) Second maximum of the temperature attained within 24 hours of the appearance of the eruption.	(7) Temperature continues high until the eruption begins to fade.
(8) Enanthem fades sooner in measles, tongue continuing with its bluish color until the commencement of this.	(8) Strawberry tongue develops.
(9) Desquamation furfuraceous, apt to be overlooked, lasts two weeks.	(9) Desquamation begins furfuraceous, becoming lamellar; large scales of skin desquamated,

process ended at any time.

#### RUBELLA, OR GERMAN MEASLES.

From a well marked case of scarlet fever the diagnosis of German measles the diagnosis presents little difficulty. The absence of its initial vomiting, the strawberry tongue, the character of the rash (which is scarlet fever is punctiform) and the shorter duration and milder course of rubella will usually decide against scarlatina.

#### FOURTH DISEASE.

In the so-called "fourth disease" the symptoms are said to resemble both German measles and mild scarlet fever, and yet to be unlike either, and the symptoms may be caused by the poison of both these affections acting simultaneously. Careful observance of the case and painstaking analysis of the symptoms, as to the nature of the malady in question.

#### VARIO LA

Scarlatina may easily be distinguished from the erythematous (scarlatinous) rash which often precedes the appearance of the variolous eruption; this is, as a rule, neither so intense nor so uniformly distributed over the skin of the body as in true scarlatina.

DIPHTHERIA. Scarlet fever, with a sloughy exudate upon the fauces may be mistaken for diphtheria when accompanied by a cutaneous erythema. The latter, however, is only what its name indicates, not a punctate eruption; in addition to which it is transient and restricted to the neck and trunk, the limbs remaining unaffected. The finding of the Klebs-Loeffler bacillus at once decides for diphtheria.

#### TONSILLITIS.

To diagnose an attack of acute follicular (lacunar) tonsillitis from scarlet fever is often difficult, and sometimes impossible. The appearance of the scarlatinous rash on the second day of the disease will declare the nature of the disease.

#### INFLUENZA.

The presence of Influenza will be determined by noting the character of the prevailing epidemic, the history of the case, the characteristic complications, and the absence of the

punctate rash and angina of scarlet fever.

#### CEREBRO-SPINAL MENINGITIS.

Owing to the sore-throat, the convulsions, and the eruption which sometimes accompany it may be mistaken for scarlet fever. The onset is, however, different, so also the eruption and the anginal disturbances. The history of the case and the character of the prevailing epidemic should likewise tend to make the diagnosis a matter of simplicity.

#### A C U T E   E X F O L I A T I V E   D E R M A T I T I S

Scarlet fever -----	Acute Exfoliative Dermatitis. -----
(1) Onset sudden, with vomiting, and frequent hard pulse	(1) Sudden with fever only.
(2) Eruption appears first on the face, neck, and chest, soon beginning diffuse.	(2) Appears first on trunk
(3) Desquamation begins after eruption has faded, often one week later.	(3) Desquamation begins early, often before eruption has faded, and involves the hands and nails.
(4) Ear and throat complications common.	(4) Absent.
(5) Nephritis of common occurrence	(5) Not so
(6) Relapses exceptional	(6) Relapses common
(7) Duration, 3 or 4 days.	(7) Duration 5 or 6 days.

#### DIAGNOSIS IN THE NEGRO.

To determine the occurrence of scarlatina in the negro is a matter of considerable difficulty, and may have to be made from the nature of the exanthem alone. The scarlatinous rash does not appear distinctive on the skin, except fortunately, upon the lighter coloured parts, such as the palms, soles, and axillae. In mulattos and octarons the diagnosis is, for obvious reasons, more easy.

#### DIAGNOSIS IN THE NEWLY BORN

This is sometimes impossible, and, owing to the normal resemblance of the skin and mouth in the newly born, a hasty opinion, in the absence of decidedly suspicious circumstances, and sometimes even then, should not be given.



## P R O G N O S I S

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As in scarlet fever it is impossible to determine from the character of the initial symptoms what the ultimate result will be, the prognosis is, therefore, uncertain in all instances, and more so perhaps than in any other disease. External and internal conditions of every possible kind combine to modify the course of the disease and to determine its issue. Even in the mildest form scarlatina is never a trifling complaint, however favourable the initiatory or early symptoms may be, the appearance of some complication, may render the disease serious, and even when the eruption has run an ordinary course there still exists danger from some sequel. Hence in a case of scarlet fever it is scarcely possible to give what is termed a prognosis; for one's forecast is at any time likely to be falsified by ~~some~~ <sup>an</sup> accident even on the very next day. Exact means of measuring the intensity of the disease do not exist; and no correct conclusion as to the probable issue of the attack can be drawn, either from the bodily condition of the patient, from his age or surrounding circumstances: severe epidemics may destroy both children and adults and the robust and carefully nursed, just as rapidly as the unhealthy and neglected. Hence, in scarlet fever, every fresh symptom of an unusual kind should be regarded with suspicion: and the greatest caution observed in predicting that any particular case will terminate favourably.

The prognosis, generally speaking, ~~be~~ may be regarded as favorable under the following conditions; when the initial symptoms are mild; when the exanthem appears at the expected time; when the outbreak is not sudden; when, in the main, it has a general distribution and completes its course rapidly, reaching its maximum early, that is, on the first or second day, or, at most, by the beginning of the third, when the angina is inconsiderable, and there is neither great difficulty in swallowing nor marked swelling, nor any other affection of the tonsils or lymphatic glands; when the temperature never exceeds 104° F, and there is only moderate frequency of the pulse, and cerebral symptoms at most slight, and only last a short time at the height of the disease; and finally, when the abatement in the eruption is accompanied by a steady decrease in the temperature, which after a few days returns to the normal - these conditions furnishing at least some guarantee that there is no further localisation of the poison, ~~Should the disease~~, however, not end here, as is quite possible in the most typical cases, one may distinguish the following conditions as also normal and indicative of a favorable termination; slight affections of the joints;

a nephritis, if it commences slowly, is of moderate intensity and of short duration, and if the fever and haematuria disappears about the third week, with only slight albuminuria, and little diminution in the quantity of the urine, as well as without cerebral symptoms and dropsy, as well as an entire absence of any kind of complication. The following symptoms are also regarded by some writers as favorable; a spontaneous haemorrhage from the nose when there are severe cerebral symptoms, excluding, of course, the haemorrhagic diathesis, a profuse salivation; and the occurrence of ~~and~~amina, if they be not too numerous. Scarlet fever running an anomalous course is particularly unfavorable, and the prognosis is at least very uncertain, especially when the following conditions are present: a continuous elevation of the temperature from 104° F. upwards, or hyperpyrexia, with dyspnoea, and extreme frequency of the pulse, and also attacks resembling collapse, accompanied by coldness of the skin and a small pulse; an exanthem of a very intense coppery hue extensively diffused, and lasting several days during its greatest height, or a livid eruption, or even, perhaps, one that is merely bluish, particularly when they are plentiful cutaneous haemorrhages; gangrenous angina, and much exudate in the pharynx, especially when it extends to the nose, larynx and air-passages; a very dry tongue, an intense coryza, great infiltration of the connected tissue in connection with involvement of the cervical lymphatic glands and parotid, especially should sloughing, migration of the inflammatory process from thence to the oesophagus and air passages, or burrowing of pus, occur; a typhoidal course; severe nervous symptoms of any kind, particularly muscular paralysis, coma, spasmodic attacks, in the glottis or elsewhere, continuous delirium or mania, insomnia, great restlessness and excitement; very frequent and long continued vomiting, with abundant dysenteric diarrhoea, especially at the outset, at a later period also, and then with or without frequent attacks of severe colicky pains and vomiting; purulent affections of the joints with or without pyaemia, with a general formation of abscesses; early onset of nephritis, general dropsy with effusion into the serous cavities, extensive haematuria and albuminuria, as well as marked diminution in the urine, or complete anuria for several days with or without uraemic symptoms, and with or without elevation of temperature; all the more important complications, such as pleurisy, and pneumonia, oedema of the glottis, hepatitis, endocarditis, pericarditis, peritonitis, meningitis and hydrocephalus, keratomalacia, and

other severe ocular affections; aural diseases; haemorrhagic tendencies; septicaemic conditions. Geissler (Küch. Zeit., 1862, l. p. 404) believes that a remarkable vivacity of the patient just before the attack is a very unfavourable sign; Marcus (Schmidt's Jahr. 29. p. 312) thinks the same when there is a sharply defined redness of the face, with a chalk-white ring about the mouth and a tremulousness of the lower lip; a similar ring has been observed in bad cases between the forehead and lips, while the nose appeared white and pointed; Krausse (Schmidt's Jahr. 71. p. 318) holds out little hope of recovery when there is a white streak traversing the dusky-red or livid face; some writers fear the result in some cases of a sudden, or, at least, rapid abatement of the eruption, as also when the latter is variable, now pale and now florid, now more fully developed at one point and now at another. By many observers, <sup>epidemic</sup> cases are regarded as more dangerous than the epidemic forms.

#### Character of the Epidemic.

The prognosis in scarlatina is frequently to be determined by the character of the prevailing epidemic. At certain times the disease is attended with most fatal complications, which may set in before the rash has made its appearance, and form a more prominent feature of the disease. Cases are recorded in which the ~~first~~ very first symptom observed was a diphtheritic process or a gangrene, and in which death occurred before anyone had an idea that the patient was affected with scarlatina. The type of the disease may be so mild throughout an epidemic or during a series of years that deaths are infrequent, but afterwards the type changes, and the percentage of deaths increases and remains high until another mitigation in type occurs. But few epidemics are really benign in character. Sydenham (loc. cit.) in the middle of the seventeenth century stated that scarlet fever, as he saw it in London, was so mild that it scarcely deserved the name of disease; "Vix nomen morbi merebatur", Morton (loc. cit. some years later, and Huxham (loc. cit.) in the following century recorded the fact that they had abundant reason to regret the change of type, and now throughout Great Britain scarlet fever is one of the most fatal and dreaded disease of childhood. The disease as encountered to-day owes its danger to the frequency of its anomalous forms, and it is, moreover, remarkable that the epidemics of various places and periods are apt, for some unknown reason, to be anomalous in single characteristics. Thus, in one



epidemic severe angina with cellulitis of the neck may be markedly characteristic, while in another diphtheritic lesions may be very common, and in a third there may be rheumatic affections, in a fourth, again, there may be dysentery, while, still further, others are extremely malignant from the ~~beginning~~ frequency and severity of the dropsy. Still, the great majority of the epidemics do not owe their danger to a single anomaly but to several, for, in many instances, there is deep infection, high fever, complicated angina, severe cerebral disturbances, and extensive dropsies, while many patients who have successfully defied the fever, the nervous symptoms, and the angina and its consequences, finally die dropsical. Richardson (Jour. f. kinderh. - 22, p. 253) observed two very benign epidemics without deaths, on two ships of war; so, too, did Gillespie (loc. cit.) in 1852 - 70 patients Graves (loc. cit.) records that in the nineteenth century, prior to 1834, in Dublin, Scarlet fever was uniformly mild, so that on one occasion of 80 patients in an institution all recovered. In 1834, however, the type of the disease totally changed and epidemics of unusual virulence occurred. The type frequently changes from mild to severe or severe to mild, not only in consecutive years, but in consecutive months. Sporadic epidemics are not, however, always any more benign than are sporadic cases, as is shown by Palmer (Wurt. Corr. 1. 1832, p. 6), when he describes the epidemic of Pleidelsheim, where the neighbouring localities were spared. In this instance, out of 1,500 inhabitants, 201 were attacked, and there were 44 deaths, so that there was a mortality of 21 per cent. many of the patients died within the first 24 hours.

#### M O R T A L I T Y.

Some of the older writers, notably Thomas (loc. cit.) consider an epidemic in which the mortality is below 10 per cent. as, comparatively speaking, of a benign nature. Johannesen (loc. cit. p. 291), who has collected 84,500 reported cases with 12,789 deaths in Norway, comes to the conclusion that in Norway the mortality is 14.7 per cent., and states that when the mortality is 13 per cent. normal conditions prevail: when it goes above, the epidemic is a severe one, when below, it is mild. The same observer reports that in certain parts of Norway the mortality went as high as 90 per cent. Hirsch (loc. cit.) states that the mortality in scarlet fever ranges from 3 to 30 per cent. Mc. Collom (loc. cit.) in his series of 1000 cases, found it to be 9.8 per cent. Hillier (loc. cit.) states that in the London Fever Hospital the mortality varied from 1:6 to 1:40; in the children's Hospital from 1:3 to 1:11. In the Manchester Children's Hospital, from 1877 - 87, the mortality

varied from 6 to 25 per cent. according to the epidemic, the average for the decade named being 11.8 per cent. Of the 10,000 cases reported by Col-lie, the mortality was 12.5 per cent. for all ages, that between 3 and 4 years reaching as high as 25 per cent. A mortality of 40 per cent. may be regarded as a most exceptional finding.

#### SEASON AND WEATHER.

Observations have thus far failed to establish any connection in the atmospheric conditions of temperature or moisture and the type of scarlet fever. In all climates and seasons grave as well as mild epidemics have occurred.

#### CITY AND COUNTRY.

The question as to which show the greatest mortality, the epidemics of the city or those of the country, has been answered differently by different writers, some finding it greater and others less in both. Certain factors, such as the density of the population and the availability of medical aid, must be taken into account in settling the question. The country is at least more exempt from the evils of overcrowding. Meanwhile, when one takes into consideration that some localities are deeply infested, while others in the neighbourhood, under the same conditions as regards population, remain free or suffer but little, the more probable view is, that the medical art will more than make up for the differences mentioned, and it is quite likely that the differences that have been observed between city and country are somewhat accidental, and dependent chiefly on the situation of the dwelling.

#### POVERTY AND OPULENCE.

The influences of poverty and opulence upon the fatality of scarlet fever are not so cogent as have been supposed. The wretchedness of the homes of the poor, and the almost entire absence of nursing and care, cause, of course, an increase of danger which those in better circumstances are able to avoid; but of far more importance as a prognostic indication is the degree of personal predisposition to scarlet fever, or, in other words, the degree of resistance to the influence of the contagion, which is not materially affected by external circumstances. Very frequently cases which are severe at first terminate fatally, notwithstanding the care and treatment. The

beneficial effects of favourable surroundings are seen, not so much in their therapeutic influence during the course of scarlet fever, as in their prophylactic power to prevent the spread of the disease.

#### NURSING AND MEDICAL TREATMENT.

As a matter of course, good nursing and proper medical advice will lessen the percentage of mortality. It is probable that in many of the epidemics of earlier times, a great mortality was due to the erroneous therapeutical notions then in vogue than would have been caused by the average severity of cases if left to themselves.

#### SEX.

Sex has little or no effect upon the mortality of scarlet fever, except as it may imply a more robust vitality. The striking differences seen in the literature are probably due to local variation in the number of male and female persons of the age most subject to scarlet fever.

#### A G E

Age bears a marked influence upon the percentage of mortality of scarlet fever. Comparatively few contract the disease under the age of one year, and the period of the greatest mortality, since it is of its greatest frequency, is between the ages of one and six years.

The following are samples of statistics bearing on the relation of age to the percentage of deaths :

		Under 1 year	1st to 6th	to 12th	
Glesishman,	Cases....	8	204	5th 260	
	Deaths...	6	88	511	
			1st to 6th	6th to 12th	1st to 20th year
Kraus,	Cases	13	113	106	40
	Deaths...	4	29	10	2
			7th to 16th year		
Voit,	Cases....	5	166	109	
	Deaths...	1	24	10	
			over 5 years		
Roset,	Cases....	43	156	93	
	Deaths...	16	31	33	
		Under 5 yrs.	5 yrs. to 10 yrs.	10th to 15th yr	Over 15 yrs
Russegger,	Cases...	101	126	47	27
	Deaths...	21	20	3	0



Fleischam (Jahr. f. Kinderh, IV. p. 223) estimates the mortality of the first year at 25 per cent., of the second to the fourth year at 43 per cent., of the fifth year to the twelfth year at 19-6 per cent., but Wasserfuhr (V-- H. Ueber., 1866 11. p. 562) observed no decrease of mortality from the second to the sixth year. Russegger Oest. med. Jahr. 1848, 63, Bd. 4., Qu., p. 277) found the mortality up to the fifth year to be equal to 20 per cent., from the fifth to the tenth year, 15 per cent., from the tenth to the fifteenth year, 6 per cent., over fifteen years, no deaths: Waidele & Schmidt's (Schmidt's Jahr. 99. p. 58) found the highest mortality up to the second year, and the eleventh year very dangerous. Krauss 'Wurt. Corresp. 1855, XXV. p. 1.) in the epidemic which occurred in 1854 in the villages of Walldorff and Oferdingen, observed the mortality to be : in the first year, 30 per cent.: in the second to the third year, 27 per cent: in the fourth to the sixth year, 26 per cent., in the seventh to the ninth year, 11 per cent; in the 10th to the 12th year, 7 per cent.,; in the thirteenth to the twentieth year 5 per cent. The 280 fatal cases reported by Voit (loc. cit.) are distinguished thus;-- first year (5:1) = 20 per cent., second to the sixth year (166: 24) = 14.4 per cent., seventh to the sixteenth year (109:10) = 9.1. per cent. Rauke (Jahr. f. Kinderh. 1869, 11. p. 43 ) found that the mortality of scarlet fever was 6.8 per cent. , while that of children under one year of age was 13.7. per cent. Zehender (Schmidt's Jahr. 14.p. 75. 1863) states that in his experience 66 per cent. died in the first year while in the following years the rate of mortality sank rapidly to 31, 23. 12. 10 per cent., rose in the sixth year to 20 per cent, and in the eight again (from 9 per cent in the seventh year) to 17 per cent., and from the tenth year onward, among 64 cases, only one, a girl of twelve years, died.

The mortality of scarlet fever may, therefore, be said to show a range of 3 to 30 per cent. of attacks and to average about 8.5. per cent. The case in mortality everywhere markedly reduced by the isolation, hospitals, which likewise, of course, limit the extension of an epidemic. Thus the case mortality in the isolation hospitals of the Metropolitan Asylums Board -- 10.343 admissions, was in 1890, only 2.97 per cent.

# T R E A T M E N T

## P r o p h y l a x i s

The prompt isolation of scarlatinous patients, is the best method of preventing the further spread of the infection, and this constitutes an indication more urgent than in the case of any other of the acute exanthemata. In the accomplishment of complete isolation a much better result can be expected than in measles, for instance, owing to the slight degree of volatility possessed by the scarlet fever poison. A complete isolation of those localities and districts suffering from scarlet fever is, owing to the commercial relations of the present day, impracticable, or is only possible under the most favourable circumstances, as in the case of an island, etc. It is even questionable whether the closing of houses containing cases of scarlet fever, as was once proposed, could be carried out; at any rate, this measure is utterly impracticable in cities: it has even been proposed by some to post a notice upon the infected dwellings. All patients who cannot be properly treated at home should be sent to an isolation hospital, and in a vehicle specially constructed for, and devoted to the purpose of, the transportation of patients. To prevent the spread of the disease ~~by~~ by non-infected persons, it is desirable to forbid the brothers and sisters of the patients from entering nurseries, institutions, and schools, and this prohibition should remain in force until the complete disappearance of every symptom of the throat and skin. These measures are even more necessary to administer than in the case of measles, not only because scarlet fever is more dangerous than the latter, but also because with the increasing years of childhood the predisposition to scarlet fever very materially lessens, and hence it is possible that children may entirely escape the disease if they be secured from exposure during early life. To this end, compulsory notification of every case of scarlet fever has been productive of most important results.

Closure of the schools - If with the first known case of scarlet fever in a school it may be taken for granted that for three to five days the case has been infecting others, one must not expect to prevent further cases of the disease by isolating it, even though the scarlatinous child is turned back immediately from the threshold of the school-room. Moreover, it becomes clear, in the same way,

that a delay in closing the school for even one - half day must have as its result new infection in ever-increasing proportions. The closing of the school , from this point of view, cannot take place too soon . At the same time , however, strict isolation of the family is required, especially the children, if in their circle a case of scarlatina has occurred.

The efforts of the physician in preventing the spread of an epidemic may be of little avail unless they receive the intelligent and hearty co-operation of the general public, in addition to which simple popular instructions as to the hygienic of scarlet fever , and the measures necessary to restrict it, may prove of incalculable benefit. The following pamphlet free distributed by the Michigan State Board of Health, in March, 1900, will illustrate the point at issue ;:-

"HOW TO AVOID AND PREVENT SCARLET FEVER."

(A) "Avoid the special contagion of the disease. It is especially important that this should be observed by children and all whose throats are sore from any cause. Children under ten years of age are in much greater danger of death from scarlet fever than are adults, but adult persons often contract and spread the disease, and sometimes die from it. Mild cases in adults may thus cause fatal cases among children. Because of these facts it is frequently dangerous for children to go where adult persons go with almost perfect safety to themselves."

(B) "Do not let a child go near a case of scarlet fever. Do not permit any person or animal to come, or anything to be brought, directly from a ~~xxx~~ case of scarlet fever to a child. Unless your services are needed, keep away from the disease yourself. If you do visit a case, bathe yourself and change and disinfect your clothing before you go where there is a child."

(C) "The contagion of scarlet fever may retain the virulence for some time, and be carried a long distance in various substances and articles in which it may have found lodgment. Do not permit a child to enter a privy or water-closet , or breathe the air from a privy water-closet , cesspool or sewery , into which non-disinfected discharges from persons sick with scarlatina have entered, nor to drink water or milk which has been exposed to such air."

(D) "Do not permit a child to ride in a closed carriage in which there has been a person sick with scarlet fever, unless the carriage has since been thoroughly disinfected with fumes of burning sulphur,



etc."

(E) "During the spread of scarlet fever in epidemic form avoid exposure to wind and to breathing cold, dry air; also the use of strong vinegar or any other substance, which tends to make the throat raw and tender."

(F) "Do not wear or handle clothing worn by persons during their sickness or convalescence from scarlet fever."

(G) "Beware of any person who has a sore throat. Do not kiss such a person. Do not drink from the same cup, nor use any article that has been used by a person sick with this disease."

(H) "Beware of crowded assemblies in unventilated rooms."

(I) "Do not permit a child to drink water or to take food which comes from a source that renders it liable to contain something derived from a person sick with scarlet fever."

#### GENERAL SANITARY MEASURES.

There can be no doubt that the most reliable and certain prophylaxis is the isolation of patients and nurses, and the thorough and judicious employment of disinfectants upon their persons, and in the apartments. All furniture and articles not absolutely required ~~xx~~ should be removed from the sick room, and no one should be allowed to enter it except the medical attendants and nurses. Constant ventilation should be insisted on by lowering the upper and raising the lower sash of the window. two or three inches in mild weather. Even in stormy weather sufficient ventilation can be obtained in this way without exposing the patient to currents of air, which should be avoided. Since the exhalations from the body, the various excretions, and the epidermic scales shed so abundantly in the desquamative period contain the scarlatinal poison, measures should be employed to disinfect them, in so far as the comfort and well-being of the patient will allow. Vessels, should receive the excretions *which* should contain perchloride of mercury solution, carbolic acid, or other disinfectant, and they should be immediately emptied and cleaned after use. By the frequent application of disinfecting solutions to the nostrils and throat, the secretions from these surfaces are to a great extent deprived of their contagiousness. If otorrhoea occur, boracic acid acts as an excellent topical remedy, but in addition the ear may be syringed with warm carbolic lotion (one drachm to the pint) and this should be continued during convalescence, for cases occur which show that the discharge from the ear is probably the vehicle by which the virus

is communicated. Even as late as the fourth week after the disappearance of the rash, children suffering from scarlet fever experience relief from having the cutaneous surface treated with some antiseptic, and in this way contamination of the air through the exhalations and exfoliations from the skin is in great part prevented.

The patient should be placed in a separate room and no person except the physician, nurse, or mother allowed to enter it or to touch the bedding or clothing used in it until they have been thoroughly disinfected. All clothing, bedding, or other articles not absolutely necessary for the use of the patient should be removed from the sick-room. Articles used about the patient, such as sheets, pillow-cases, blankets, or clothes, must not be removed from the sick-room until they have been disinfected by placing them in a tub containing a powerful disinfectant, and allowed to soak there for at least an hour and then placed in boiling water for washing. A sheet dipped in the same solution and suspended in the sick-room constantly, and another similarly treated suspended in front of the doorway may prove of service. All vessels used for receiving the discharges of patients should have some disinfecting solution added thereto, and immediately after being used by the patient ~~shall~~ should be emptied and cleaned with boiling water. Water-closets and privies should also be disinfected daily with the same disinfecting fluid or a solution of chloride of lime, or of iron chloride, with or without carbolic acid, may be used instead. All Straw beds should be burned. It is not advisable to use handkerchiefs about the patients, but rather soft rags, for cleansing the mouth and nostrils, which must be immediately thereafter burned. The ceilings and side walls of a sick-room after removal of the patient should be thoroughly cleaned and lime-washed and the wood-work and floor thoroughly scrubbed with soap and water. Experience has proved the undoubted efficacy of having the patient segregated and isolated in a room which is both commodious and well ventilated. Its temperature should be uniform at about 70°F. during the course of the fever. When the latter begins to abate and the desquamation commences, a temperature of 75°F is preferable, so that there is less danger that the surface may be chilled during unguarded moments, as at night, when the body may be accidentally uncovered since sudden cooling of the surface at this time may cause nephritis or some other danger our inflammation, for it has been noticed that those who are carefully protected from vicissitudes of temperature, who remain during convalescence in a warm room, and are protected by plenty of clothing, more frequently escape this complication, than such as are under the restraint of

this kind and are carelessly exposed in times of changeable weather . It is nevertheless a fact that a certain proportion suffer from nephritis however judicious the after-treatment may be, and that even the best hygiene does not always prevent its occurrence. The patient should not, therefore, leave the house until four weeks after the beginning of the fever, and in inclement weather not till a much longer period has elapsed: so long as desquamation is going on and the skin has not regained its normal function the patient should remain indoors, and when finally he is allowed to leave the house he should be warmly clothed.

#### DISINFECTION .

Owing to the importance of the subject some detailed consideration is demanded. Authorities are somewhat at variance as to the efficacy of the measure in scarlet fever. Vogl ("Mitth. aus zwei Scharlachepid. in dene Jahren 1884- 85 "-- und 1894--95"-- Mün. med. woch., 1895) believes that success is only to be expected by the limitation and even the discontinuance of outside intercourse; that this is <sup>or</sup> best a difficult and unsatisfactory defensive measure, but it accomplishes more, and is more effective, than the use of costly disinfecting apparatus, whose limited influence (disinfection of the body linen) will not affect the outcome in the slightest degree.

Hagenbach -- Burkhardt (Jahr. f. kinderh., N.F.Bd. XLIV, S. 111 - 115), commenting upon an actual case, says that as soon as scarlatina was diagnosed, the patient was removed with all the bedding to the isolation department. The entire room was at once emptied, the walls washed, the room disinfected, and, in as scientific a manner as possible, in the following order; chlorine fumes, sulphur, the carbolic spray, and the sublimate spray. Special attention should be paid to the thorough airing of the room, and this may be successfully carried out even in large apartments, provided there are on both sides large window spaces. Such complete air-cleansing was hardly possible in the smaller rooms. It is a fair conclusion that the scarlatinal poison must be a very persistent one, since after months of inoccupancy of the room, infection repeatedly took place; moreover the disinfection and absolute thorough cleansing were unable to drive ~~from~~ it from the house; and the precautionary measures adopted were unavailing.

It appears certain, therefore, that disinfection carried out, according to our present knowledge, may prove of no avail in scarlet fever,



although its desirability in all cases, reasoning on general principles, must be obvious.

The following are the measures of quarantine and disinfection employed for scarlet fever and diphtheria patients in a New York Isolation Hospital (vide Report for 1901):-

Each patient occupies a private room, there being no wards. The laundry is in a separate building. The disinfecting plant is also separated from the Hospital, and consists of a steam tank and formaldehyde chamber. In the former the steam is raised under pressure to a temperature of 230°F., and kept on for half an hour. If formaldehyde is used, the articles to be disinfected are exposed to the gas continuously for twelve hours.

Patients are carefully examined before being admitted; and if there is any question in Ward to diagnosis they are placed in the observation room. The resident physician before entering the presence of the patient is required to wash his hands thoroughly with soap and water, followed by immersing them in bichloride solution, 1:2000. Agown is supplied with buttons closing round the neck, covering the collar and enveloping the body completely, just clearing the floor. To this is added a cap arranged to cover the head and neck, exposing only the face. This, with a pair of rubber overshoes, completes the uniform: when he leaves the patient the hands and face are disinfected thoroughly and the mouth is cleansed with boric acid solution. All visitors have to obey the same regulations. Ladies, if admitted at all, are required to remove their outer skirts before putting on the uniform.

Patients are not allowed to leave until free from contagion. They are examined repeatedly, particular attention being given to the feet, which are sometimes slow in finishing desquamation. The scalp requires washing, as does the external auditory meatus, which is often found filled with desquamating epithelium in cases otherwise free from contagion. During the week preceeding discharge, patients have their ears irrigated with bichloride solution 1: 8000, and the scalp shampooed on alternate days.

On the day of discharge the following routine is adopted for adults (for children special instructions are given in each case) ; (1) The ears are irrigated with bichloride solution 1:8000 ; (2) the scalp is shampooed with soap and water; (3) the scalp is shampooed with bichloride 1:2000;

(4) a tub-bath is given with soap and water; (5) a tub - bath is given of bichloride solution 1;8000 for twenty minutes; (6) a sponge bath is given of bichloride solution 1;2000; 7) the bichloride is sponged off with sterile water; (8) a nasal spray is given of bichloride solution 1;800 o; (9) the mouth is cleansed with saturated solution of boric acid. There is a suite of discharge rooms, used as follows; In No. 1 the patient leaves the hospital clothing. In No. 2, he is disinfected. In No. 3 he puts on his freshly disinfected clothing.

All clothing that can be washed is disinfected with steam. For other articles formaldehyde gas is used. Books and papers are steamed after removing the leather binding of the former. The print is slightly blurred as a result, but no further damage is done. Toilet articles are treated in the same way, but jewels (pins, rings, bracelets etc.) are disinfected with pure carbolic acid. Watches are exposed to formaldehyde gas. In this hospital there has been no history, as far as can be ascertained, of contagion from a discharged patient.

#### PROPHYLACTIC USE OF MEDICINE.

The administration of medicines to ward off an attack of scarlatina has met with signal failure. Long ago Hahnemann (Höhl-ler's Handbuch der spec. Therap., Tübingen, 1867, Bd., 3d. Edn. S. 37) vaunted belladonna to protect his patients, and on homeopathic principles, Bichloride of mercury and oil of Eucalyptus have been recommended in this country. Speransky (Arch. f. Kinderh., XXIV, 423) states that he gave one or two drops twice a day to 12 children, who had been exposed to scarlet fever, with the result that none of them contracted the disease, although they continued to associate with infected cases. In spite of Krause's advocacy (Vratsch, 1896, No. 31) this "specific" has not met with general acceptance.

#### PREVENTIVE INOCULATIONS.

Stickler (Trans. Med. New Jersey, 1897) reports that by inoculating children (contacts) with mucous from the throats of recent cases (hypodermically) he was able to produce a mild type of the disease, but found that it was nevertheless of too severe a nature to allow of the adoption of such procedure to secure immunity. The disease thus produced had scarcely any incubation stage, as the temperature rose in two hours and the rash appeared usually within 24 hours.

## MANAGEMENT OF THE DISEASE.

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Many of the more important points regarding the patient, his apartment and its appointments have already been noted above.

### D I E T.

This should consist almost entirely of liquids during the first two weeks of the illness, and during convalescence vary according to the age and condition of the patient. The question is an important one, and it must be our constant aim ~~not~~ to tax the kidneys, already in a catarrhal condition, as little as possible with nitrogenous materials, hence during the period named, milk, either alone or diluted with barley-water, should be given exclusively, in addition to which plain water - or one of the aerated - may be allowed. An addition to the diet may be made at the end of the second week, in the way of thin soup, beef-tea, mutton broth, or chicken broth, provided the patient shows improvement, and the urine remains normal. Gradually more substantial articles of diet, such as custard, lightly boiled eggs, toast, oatmeal gruel, and finally fish, fowl, baked potatoes, and meat may be exhibited. In mild cases fruit may be given from the first. A bland aperient, as citrate of magnesia will regulate the constipation, failing which enemata will be serviceable.

### SERUM THERAPY.

Baginsky (La Semaine Med. 1902. Appendices p. 158) states that Marmorek's antistreptococcic serum is useless upon scarlet fever, but by using one according to the prescription of Aronson, he reduced the mortality of the disease from 14 to 11 per cent. Results in the hands of others do not establish any particular advantage for the procedure. Marmorek's serum is prepared by inoculating horses with the virulent streptococci, the final dose to the animal being 600 c.c. of a virulent culture, and the preparation requires a year for its manufacture.

Blood - serum of Convalescents. Roger (Presse Med. 1896, IV., 425) describes a case upon whom the exhibition of this was attended with marked benefit. The patient came under his care on the second day of the disease in a comatose condition; hydrotherapy and saline infusion had failed to benefit; death seemed imminent; and a serum was rapidly prepared from the blood of a person convalescent from scarlet fever. The patient was himself first



bled and 80 c.c. of the convalescent serum injected into a vein, with the result that the patient rallied five hours later. As he was nevertheless still in a grave condition the cold baths were resumed and the gain in improvement was greatly ~~increased~~ increased. The unfavourable symptoms were, next day, observed to have entirely disappeared, and the patient recovered in due course. Crede's Ointment. This consists of colloid of silver, and has been used by Baginsky (Die Therap. der Gegenwart, 1900, p. 252) in thirteen test cases of great severity, but with disappointing results; Only 3 out of the 13 cases survived, and suffered from nephritis, otitis, and other serious complications

#### EUCALYPTUS INUNCTIA.

Curgenven (Med. Mag. IV. 470) and others claim for this procedure a reduction of mortality. A comparative scarcity of complications, a shorter illness, and the prevention of the spread of the disease to others.

#### HYPODERMIC INJECTIONS OF STERILE SALT SOLUTIONS.

Forchheimer (loc. cit. p. 100), in all cases of scarlatina with grave septic infection and particularly in threatened uraemia, strongly recommends subcutaneous injections of large quantities of sterile salt solution, and has even suggested the direct transfusion into a vein, or injection with serous cavities of sterile normal salt solution, with the object of diluting the poison circulating in the blood, and as a mechanical aid to diuresis and the elimination of toxins. On theoretical grounds and from experience in other analogous conditions the method should prove successful.

#### T H R O A T.

The throat is too often neglected in scarlet fever, and yet it is the focus from which spread many of the dangerous complications of the disease. The throat, should, therefore, be often syringed with antiseptics, though even the use of hot water gargles will give immediate relief should they not be available. So long as the angina remains at all moderate, and gives rise to no dangerous symptoms, it may suffice to frequently apply cold dressings to the neck, or to allow the patient pieces of ice to suck, and to aid the effect of the same with detergent mouth washes and gargles; for very often, in the case of children, any

further local treatment is impossible, or occasion them great excitement. Forchheimer (loc. cit. p. 94) has obtained pleasing results from the use of a 0.5 per cent. solution of salicylate of soda, one teaspoonful every two hours, in cases of young children resenting the spray. For spraying purposes a saturated solution of boric acid, a 1- per cent. solution of carbolic acid in lime - water, or dilute peroxide of hydrogen are to be recommended. The spray should always be supplemented by the gargle in cases of severe angina; the addition of glycerine to the hot water already recommended (one drachm to the pint of ) markedly relieves the choking sensation so common in these cases.

## F E V E R

### HYDROTHERAPY.

The use of antipyretics in scarlet fever is gradually giving place to the method of hydrotherapy, and there now exists an almost unanimous opinion as to the value of cold water, in the form of cold syringings, cold packs, or the cold bath, applied to meet the need of the individual case, as the safest and most reliable means for reducing the temperature in scarlet fever. Here, as in typhoid fever cold water is of the greatest service; not only does it lower the temperature, but quiets the nervous excitement, inducing almost always a more or less prolonged sleep; and, above all, it aids in diuresis. The action on the pulse is equally manifest; in infants it may fall from 180 to 150. The diarrhoea and vomiting so frequent in the grave forms, is lessened, or even ceases under the action of the cold bath. Scarlet fever appears to have been one of the first diseases to be treated by cold baths. In 1798, we read of Currie - who did more than anyone else to upset the popular prejudice against "catching cold" - recommending the procedure. He appears to have thus treated over 150 children during the severe Liverpool epidemic of 1801, and with marvellous results. Jurgensen (loc. cit., p. 238) maintains that the use of cool baths cannot be surpassed as a remedial measure, from the very commencement of scarlet fever until the subsidence of all severe symptoms. He advocates hydrotherapy as soon as the rectal temperature reaches 104°F., the temperature for the bath of young children being 68°F. and its duration five minutes. In the case of older children and adults, however, the temperature of the bath may be reduced to 59°F. and immersion prolonged from five to fifteen minutes. Both Hanoch (loc. cit. ) and Jacobi (Therapeutics of Infancy and Childhood, 1898, p. 237) disapprove

of the cold bath as tending to produce collapse, but heartily recommend cold sponges and cold packs.

In order to overcome, if possible the resentment of the family to the use of the cold bath, the water may be used at a temperature of 80°F. or higher, and be then gradually reduced to the desired point, preferably ten degrees above that recommended by Jurgensen, which is often impracticable, and no more satisfactory. In severe cases with grave cerebral disturbance, as drowsiness, stupor, and even coma, Steffen (loc. cit.) recommends that the patient be placed in a tepid bath and cold water poured, for five minutes, upon the head. Ice caps or iced water greatly benefit these cases.

Jurgensen (loc. cit.) gives the following contraindications to the use of the cold bath in scarlet fever; 1. All markedly developed conditions of cardiac weakness, from whatever cause, in case the attempt to considerably increase the cardiac action by stimulants fails. No attempt at reducing the temperature in the presence of anatomical and especially inflammatory processes involving the heart must be made.

2. All signs of *dyspnoea* accompanied by stenosis of the upper respiratory tract, as the violent respirations induced by the procedure only bring harm to the patient.

3 Haemorrhage from the nose, the mouth, from eroded vessels in the neck, in haemorrhagic diathesis.

4. All inflammations involving the joints; for it is advisable that the patient be spared the pain that is unavoidably caused by the exertion occasioned by bathing.

Cases characterised by extreme restlessness, marked delirium, and convulsions, as a rule, yield more readily to an extremely hot bath, at a temperature ranging from 105° to 110°F.

#### ANTIPYRETIC DRUGS.

Osler (loc. cit.) believes that medicinal antipyretics are not of much service in comparison with cold water. The only one of the coal-tar preparations which Jurgensen recommends is phenacetine. Its influence, even in large doses, is uncertain. About 7 grains, four times a day, may be given to adults, children in proportion, - being insoluble, it is best given in cachets. It appears to have influence in septic conditions.

Henoch. (loc. cit. p. 684) in addition to the bath, gives a single dose of either quinine (gr.



Vll--XV) <sup>as</sup> phenacetine (gr. lV--Vlll) between 5 and 6 p.m. (loc. cit) advocates quinine in doses of 1 to 3 grains, together with cold packs when the temperature remains elevated

Owing to the depression produced, antifebrin and antipyrin are now almost discarded, in addition to which the production of methaemoglobin must be taken into account.

#### GENERAL INDICATIONS.

The above treatment will ~~xxx~~ usually be found sufficient for any case of scarlet fever of mild or moderate severity. If no gastric be present a mixture of the tincture of the perchloride of iron, with or without dilute hydrochloric acid, or chlorate of potash with liquor ammoniae acetat, may be given: to the latter  $\frac{1}{2}$  minim dose of the tincture of aconite may be added, if indicated by a rapid, hard pulse, and given for forty eight hours.

#### STIMULATION

The routine use of alcohol is not to be recommended in Scarlet fever, and is not so necessary as in long-continued fevers like enterica. Its part elimination by the kidneys must be remembered in our endeavours to prevent disease of those organs. Champagne is probably the best form of alcohol for administration, and may be given iced. The writer believes it far better to use other remedies when stimulants are required as such. Thus strychnine, ~~xx~~  $\frac{1}{100}$  grain to a child of three, thrice daily) gives admirable results, and the exhibition of digitalis may be relied on to correct any weakness, softness, or low tension of the pulse observed. In septic or toxic cases, threatened with collapse stimulation must be vigorous. Teaspoonful dose of brandy, or whisky, or 5 to 15 minims of aromatic spirits of ammonia, with or without equal parts of aether in camphor water, may be given every hour until the patient shows sign of reviving. Hensch (loc. cit. p. 685) warmly recommends the use of camphor ( $\frac{1}{2}$  to 3 grains every two or three hours hypodermically, or in solution with aether 1 in 10) in these grave cases. Musk ( $\frac{1}{2}$  to three grains every two hours) may prove serviceable. In cases of impending collapse, Moizard (loc. cit. p. 161) recommends caffeine ( $\frac{3}{4}$  to  $1\frac{1}{2}$  grains) or sparteine sulphate ( $\frac{3}{4}$  grain) hypodermically, and Jacobi (loc. cit.) in toxic cases with low temperature gives morphine in doses of  $1/50$  to  $1/20$  grain.

The hot bath or pack and bromide of potash sometimes relieve cases of active delirium, this

indication being likewise met by chloral hydrate.

Local depletion by leeches has proved beneficial in the practice of certain writers: the old method of blood-letting has now been discarded.

#### TREATMENT OF COMPLICATIONS IN SEQUELAE

##### ANGINA;

Severe throat troubles especially of the septic kind, should be treated by the application of ice to the throat, and neck; spraying of the throat, and pharynx, with hydrogen peroxide (2 to 3 per cent.), and by the use, every two or three hours of a gargle of potassium permanganate or of chloride of potash (15 grains to the ounce of water).

Geo (loc. cit.) strongly recommends a strong acid solution of chlorine water, prepared by the addition of strong hydrochloric acid to potassium chlorate in water in the proportion of 5 minims, 9 grains, and 1 ounce respectively) and shaking the mixture in a large stoppered bottle. Jacobi (loc. cit. p. 260) has satisfied himself as to the benefits of potassium chlorate (15 grains in the 24 hours) in all cases of membranous pharyngitis.

When the membrane is seen to spread beyond the tonsils the nature of the complication should be determined by the bacteriologist; and if due to the klebs Loeffler bacillus, large doses of anti-toxin should be given at once. When, however, this bacillus is not found, antistreptococcic serum should at once be given in the hope of limiting the process.

Should the throat-affection spread to the posterior nares and be accompanied by coryza and acid, irritating discharges, a mild antiseptic douche - dilute chlorine water, dilute peroxide of hydrogen, or 1 per cent. carbolic acid - will be required.

In cases of gangrenous angina, the parts affected may have to be cauterized. This can be done conveniently by the galvano-cautery or the instrument devised by Paquelin, due regard being, of course, paid to the proximity of large blood-vessels. Henboners method (vide Henoch., loc. cit. p. 686) of injecting the tonsils with 3 - to 5 - per cent. solution of carbolic acid is regarded as of doubtful value. Satisfactory results have, however, been derived from topical applications of carbolic acid (5 per cent) or of salicylic acid in alcohol. Retropharyngeal abscesses require incision.

Should diphtheria be seen to develop, even at a late stage, the specific antitoxin must at once

be injected, and its efficacy enhanced by the topical application, every four hours, of Loeffler's solution (menthol, 150 grains; dissolved in tolnol, 1 ounce 40 minims; liquor ferri sesquichloride; 1 ounce, 8 minims, and absolute alcohol, 2 ounces), ice-bags externally, as well as the exhibition of stimulants.

#### THE LYMPHATICS.

The enlargement and tenderness of the cervical lymphatic glands can usually be relieved by cold applications externally; failing which, poultices may be indicated. If pus be detected the affected part must be incised, drained, and treated on antiseptic principles. The condition known as "Angina Ludovici" calls for free incision, even before the occurrence of suppuration. An inflamed gland should be painted over with flexible collodion and its immediate neighbourhood as well, twice a day until a thick membrane is formed, whose continuity should be constantly kept up by repeated applications of the medicament. Whenever this method - introduced by Forchheimer (loc. cit. p. 195) has been employed the occurrence of angina Ludovici has been prevented.

#### O T I T I S.

The treatment of disease of the ears should never be postponed until convalescence has set in. From the beginning the secretions should be very carefully removed from the nose, throat, and lower portions of the Eustachian tube by means of douches and gargles, and from the external auditory meatus (after spontaneous or artificial opening of the membrane tympani) by means of irrigations, three times a day, consisting of equal parts of hydrogen peroxide and boiled water. The irrigations must be persisted in until all otorrhoea ceases. During convalescence lysol (1 to 2 per cent.) resorcin (2 to 3 per cent.) may, if desired,

be used instead of peroxide; and later, the ear may be insufflated with boric acid powder twice a day after irrigation.

#### N E P H R I T I S

As soon as any signs of this dreaded complication be observed every effort must be made to promote the functions of the skin and bowels so as to relieve the kidneys as much as possible and lower the arterial tension. Diuretics do not markedly relieve the condition: the best water in



large quantities, but objection can be urged against lemonade, or the preparation known as diuretin. Digatitisesseems to be of doubtful efficacy, and is not usually given. The action of the bowels can be promoted by salines, such as Rochelle salts, citrate of magnesia, Seidlitz powder, etc. Calomel, owing to its irritating effects upon the kidneys, should be avoided.

The action of the skin may be promoted by hot baths or hot packs. Should the former be given, <sup>of</sup> the temperature of the water should be about 105° and the child be immersed for fifteen minutes and the cutaneous surface gently massaged. Following this he should be kept in a warm bed. If the hot pack be preferred the patient must be wrapped in a blanket wrung out of hot water, at 100°F., and covered with a dry blanket and mackintosh sheet. In certain cases the hot air bath proves more efficacious. The method of using it consists in enveloping the patient in a blanket with hot bricks or hot flat irons placed on either side of it (in such a way as not to burn) with a mackintosh and another blanket over these.

The hot pack usually produces profuse diaphoresis. Should it fail, pilocarpine (gr. 1/13 to 1/16, hypodermically) may be tried. The fact, however, that, especially in children, it may produce symptoms of collapse must not be lost sight of. It is contraindicated in cases of marked bronchial catarrh.

When symptoms of uraemia appear, the treatment must be more active. The bowels must be put into vigorous motion at once, and the diaphoretic measures, above described, repeated. Pilocarpine preceded by a dose of alcohol, appears to be particularly useful in uraemic cases, and the blood-pressure may be still further lowered by the judicious use of nitroglycerine. The nervous symptoms, of a twitching or convulsive kind, may be allayed with opium or chloral: chloroform anaesthesia has sometimes to be resorted to, as also leeches or venesection. The serous cavities must be carefully watched for signs of dropsy. In cases of hydrothorax and hydropericardium especially, aspiration must not be delayed, as so many patients die from neglect of this precaution.

When anasarca is very great and ~~the heart~~ <sup>the</sup> feeble, the heart appears to be meeting with too great resistance on the part of the overfilled lymphatics of the skin and connective tissue, puncture of the extremities should be made. Not only are these indications met by this method, but large quantities of urea are got rid of in the fluid that exudes from the punctures. Digatitidis or strophantylus may

be used as cardiac tonics and diuretics. For the anaemia which accompanies nephritis, and troubles the patient during convalescence, one of the iron preparations must be given: the author has had excellent results from the tincture of the perchloride.

#### A R T H R I T I S.

Streptococcus infection being now held as etiologic of the acute synovitis or arthritis of scarlet fever, it must be treated as such and not as rheumatism as heretofore. Mild cases are markedly benefitted by belladonna and chloroform liniment; severe ones require the joints to be wrapt in cotton wool and bandaged. Failing relief in this way, antistreptococcus serum may be tried. The salicylates, whilst less effective than in true rheumatism, may do good. If there be pus present, or if the joint be distended with serous effusion, aspiration or incision of the joint may be resorted to. Tenosynovitis is best treated locally by the application of ice, or as the case may require, warm applications. The author believes mercurials to be markedly beneficial in these cases when applied locally. Affections of the joints and tendons require careful after-treatment in order to prevent deformity. Works devoted to orthopaedic surgery detail the necessary procedure.

True rheumatism must be treated on general principles.

#### H E A R T   A F F E C T I O N S†-

The condition of the heart requires careful watching throughout the disease, more especially when grave symptoms develop or should arthritic or rheumatic conditions be observed. Endocarditis and pericarditis must be treated by the swallowing of small pieces of ice, the application of ice-bags over the heart, or by the use of digitalis. The treatment in cases of pericardial effusion has already been indicated.

#### BRONCHITIS, PNEUMONIA, AND PLEURISY.

Respiratory complications require the usual treatment. Paracentesis must at once be resorted to should pleurisy be attended with effusion, and a rib be resected and the matter drained in the event of its becoming purulent.

Amuch

#### M O U T H.

The care of the mouth has already been

described; and, if carefully carried out, stomatitis will seldom complicate the illness. Asepsis must be the key-note of the treatment. Severe ~~and~~ cases associated with ulceration and sloughing are usually benefitted by the local application of a 10. per cent. solution of nitrate of silver, failing which curetting may be tried ~~or~~ the actual cautery used under an anaesthetic.

#### GASTRO-INTESTINAL TRACT.

Serious gastric irritability, with excessive vomiting, can usually be relieved by calomel ( 1/12 grain); bismuth subnitrate (5 to 10 grains); or bicarbonate of soda (5 to 10 grains), every two hours; failing which opium (1/60 to 1/150 grain), or hydrochlorate of cocaine (1/50 grain) may be given at similar intervals until the obstinacy of the condition is overcome. With the exception perhaps of albumin-water, food of any kind should be withheld for several hours.

The diarrhoea that occurs in the beginning of the disease requires very little attention, and then only when it becomes profuse and seems to cause debility. A moderate diarrhoea coexistent with dropsy is rather to be desired, and requires no active treatment. If, however, persistent or occurring later in the disease, bismuth subnitrate with salol, tincture of opium, or starch-water and laudanum, will usually control it. A careful diet is of special importance in these cases, and should consist of farinaceous substances with eggs, the albumen of which, as well as vegetable albumins, may be substituted for milk, provided the stomach can digest them.

#### E Y E.

Severe conjunctivitis requires the assiduous application of cold water dressings, or of ice. In severe cases of keratitis the spontaneous ruptures of the cornea may frequently be prevented by the local application of intense cold, the use of atropine, or finally by puncture of the cornea. The eye must be kept closed, and some endeavour made to remove the secretion, but with struggling children no undue force should be used lest perforation be thereby produced. As a result of purulent keratitis the eye may have to become extirpated.

#### P U R P U R A.

Severe cases of purpura do not usually respond to treatment, but the fruit juices sometimes do good in milder attacks. The distressing stomatitis of the condition requires special attention



as above indicated. The general system requires to be treated with the haemoglobin preparations; haemol, ferratin, bovinine, and beef-juice are useful. The kidneys having their function frequently interfered with in these cases, must be taxed as little as possible, and the dietary arranged to suit the individual.

#### SURGICAL AND PUERPERAL SCARLATINA.

These conditions should be treated on general principles, and if possible prevented from occurring by prophylactic procedure. Puerperal streptococcus infection appears to be amenable to Marmorek's serum.

#### SCARLATINA COMPLICATED WITH OTHER DISEASES.

Whichever malady appears to be most urgent should receive the attention it requires, but it is usually possible and desirable to treat both conditions simultaneously.

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TEMPERATURE CHARTS OF NUMEROUS CASES OF SCARLET  
FEVER PERSONALLY OBSERVED.

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EXPLANATORY NOTES.

- KATE HANCOCK. - Shows beneficial effects of the use of antistreptococcus serum.
- ARTHUR GOODWIN.- Complications of diphtheria. Death from heart failure. 8,000 units given.
- E. RICE.- Secondary rash six days after admission. Diphtheritic angina, so antidiphtheritic serum given, and with excellent results.
- ARTHUR VAUGHAN.- Antistreptococcus serum beneficial.
- LILY SLOYDE.- Secondary rise of temperature due to rheumatoid pains.
- P. ROBERTS.- Diphtheritic throat. Both antidiphtheritic and antistreptococcus serum given. Temperature falls, but rises again with the onset of albuminuria.
- MAY SLATER.- Rheumatoid pain cause rise of temperature.
- A. RATCLIFFE.- Diphtheritic throat. 28,000 units of antidiphtheritic serum injected. Antitoxin rash in two weeks.
- ELIZ. RYDER.- Both antidiphtheritic and antistreptococcus serum administered.
- J. W. CLARKE.- Diphtheritic throat. Beneficial effects of antidiphtheritic and antistreptococcus sera.
- ARTHUR WILLINGTON.- Benefited by antidiphtheritic and antistreptococcus sera.
- WILLIAM STANYER.- Diphtheritic throat. Benefited by antidiphtheritic serum, and markedly by the like antistreptococcus preparation.
- MARY STYLES.- Diphtheritic throat. Temperature falls immediately after antidiphtheritic serum.

- JOSEPH STUBBS.- Diphtheritic membrane on throat.  
Pyrexia reduced by antidiphtheritic serum.  
Antitoxin rash.
- BERNARD SCOTT.- Secondary rash two weeks after admission. Temperature above normal only two days.
- PERCY BELLWARD.- The rise of temperature at the end of two weeks due to albuminuria.
- MAUD FENTON.- Diphtheritic throat. Antitoxin given.
- S. A. REEVES.- Erratic temperature due to nasal discharge.
- M. E. HEATH.- Temperature persistently high - due to patch on throat. Antidiphtheritic serum helped her, but did not avert the fatal issue.
- ELIZ. OWEN.- Dirty throat. Antitoxin given. Swinging temperature for three weeks. Antidiphtheritic serum given which reduced the pyrexia.
- CYRIL REDFERN.- Considerable albuminuria and haematuria.
- F. WRIGHT.- The illness presented no extraordinary features.
- W. BROWN.- Nephritis. Albuminuria.
- N. SHELLY.- Contracted scarlet fever in surgical wards of the North Staffordshire Infirmary. Wound septic, which accident accounted fully for the hyperthermia of the case.
- I. GREEN.- A simple case with good recovery.
- M. TOFT.- Continued fever, due to the diphtheritic throat.
- R. LEECE.- Albuminuria in three weeks, and also rise of temperature.
- H. HICKEN.- Diphtheritic throat. Immediately benefited by the specific serum.
- H. PARKER.- Little of note.
- K. BULL.- Subsequent rise of temperature, due to rheumatoid pains.
- A. BRITCHARD.- Scarlatina complicated diphtheria.



- J. COPE.- Nothing of note.
- H. WOOD.- Diphtheria complicating scarlatina,Albuminuria. Phthisis.
- E. MADELEY.- Rise of temperature at the end of fifth week.
- R. TAGG.- Complication of diphtheria and albuminuria.
- G. TAGG.- Temperature somewhat erratic.
- W. PARKER.- Antidiphtheritic serum given where no diphtheria, and with good effect. Secondary rash and albuminuria.
- J. HOLL.- Albuminuria and haematuria, giving rise of temperature.
- T. AVERILL.- Died of broncho-pneumonia in three weeks.
- M. TAYLOR.- Erratic temperature without apparent cause.

<i>Time.</i>	<i>Bowels.</i>	<i>Urine</i>
1850	10	10
1851	10	10
1852	10	10
1853	10	10
1854	10	10
1855	10	10
1856	10	10
1857	10	10
1858	10	10
1859	10	10
1860	10	10
1861	10	10
1862	10	10
1863	10	10
1864	10	10
1865	10	10
1866	10	10
1867	10	10
1868	10	10
1869	10	10
1870	10	10
1871	10	10
1872	10	10
1873	10	10
1874	10	10
1875	10	10
1876	10	10
1877	10	10
1878	10	10
1879	10	10
1880	10	10
1881	10	10
1882	10	10
1883	10	10
1884	10	10
1885	10	10
1886	10	10
1887	10	10
1888	10	10
1889	10	10
1890	10	10
1891	10	10
1892	10	10
1893	10	10
1894	10	10
1895	10	10
1896	10	10
1897	10	10
1898	10	10
1899	10	10
1900	10	10
1901	10	10
1902	10	10
1903	10	10
1904	10	10
1905	10	10
1906	10	10
1907	10	10
1908	10	10
1909	10	10
1910	10	10
1911	10	10
1912	10	10
1913	10	10
1914	10	10
1915	10	10
1916	10	10
1917	10	10
1918	10	10
1919	10	10
1920	10	10
1921	10	10
1922	10	10
1923	10	10
1924	10	10
1925	10	10
1926	10	10
1927	10	10
1928	10	10
1929	10	10
1930	10	10
1931	10	10
1932	10	10
1933	10	10
1934	10	10
1935	10	10
1936	10	10
1937	10	10
1938	10	10
1939	10	10
1940	10	10
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1942	10	10
1943	10	10
1944	10	10
1945	10	10
1946	10	10
1947	10	10
1948	10	10
1949	10	10
1950	10	10
1951	10	10
1952	10	10
1953	10	10
1954	10	10
1955	10	10
1956	10	10
1957	10	10
1958	10	10
1959	10	10
1960	10	10
1961	10	10
1962	10	10
1963	10	10
1964	10	10
1965	10	10
1966	10	10
1967	10	10
1968	10	10
1969	10	10
1970	10	10
1971	10	10
1972		

Mary Ellen Taylor

9 A. Campbell

10 yrs. Hauler

Product back

Re-7. No

BOOK

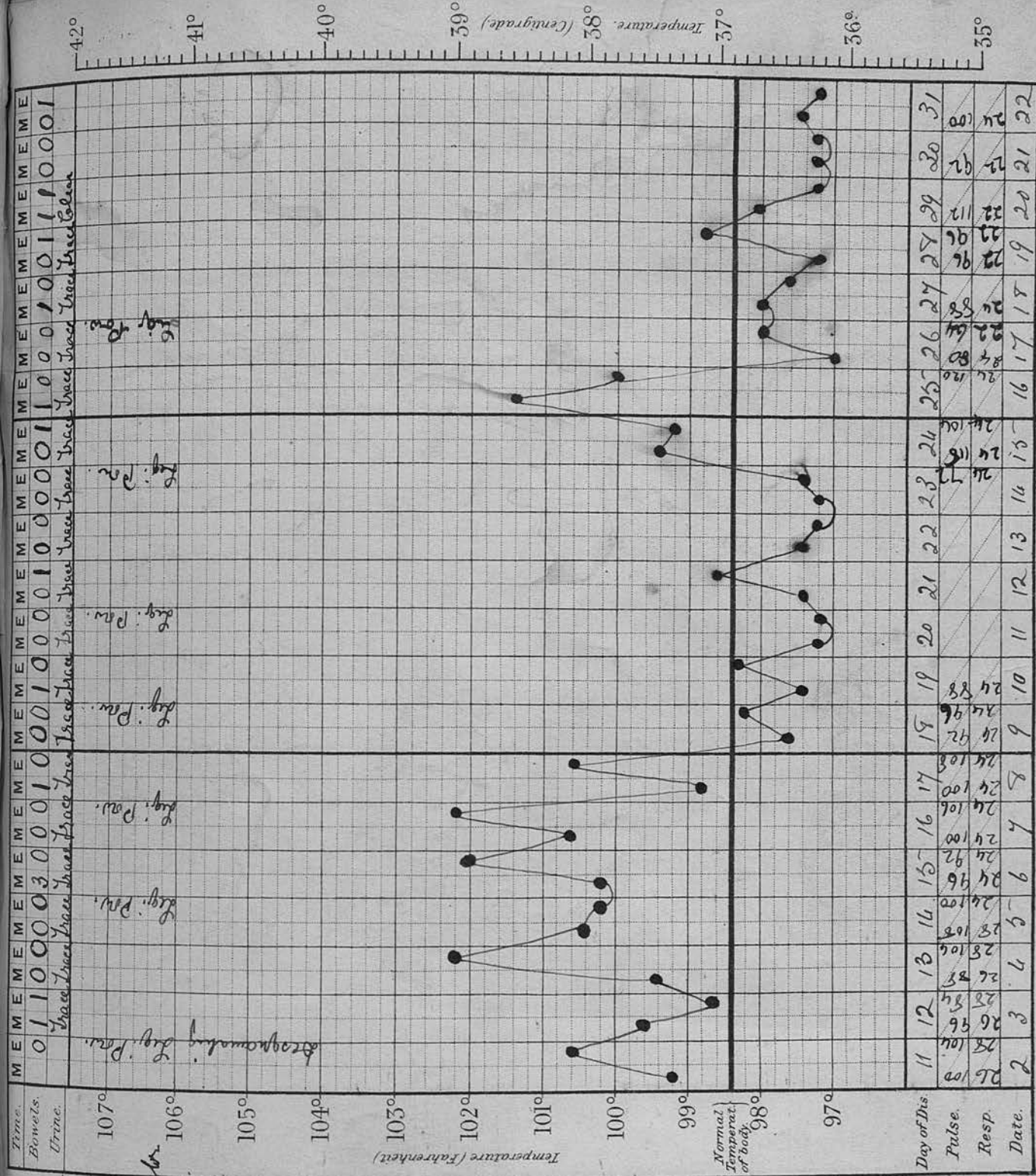
Dec-23<sup>rd</sup>

Sore throat

Madache Hash

24.4.

Wm. Lloyd Garrison



*Date of admission.*

2nd Jan 03-

## Result

*Entered at Stationer's Hall.*

Printed and Published by Widderspoon & Co. 6, Gate Street, Lincoln's Inn

*Gould's Clinical Chart*

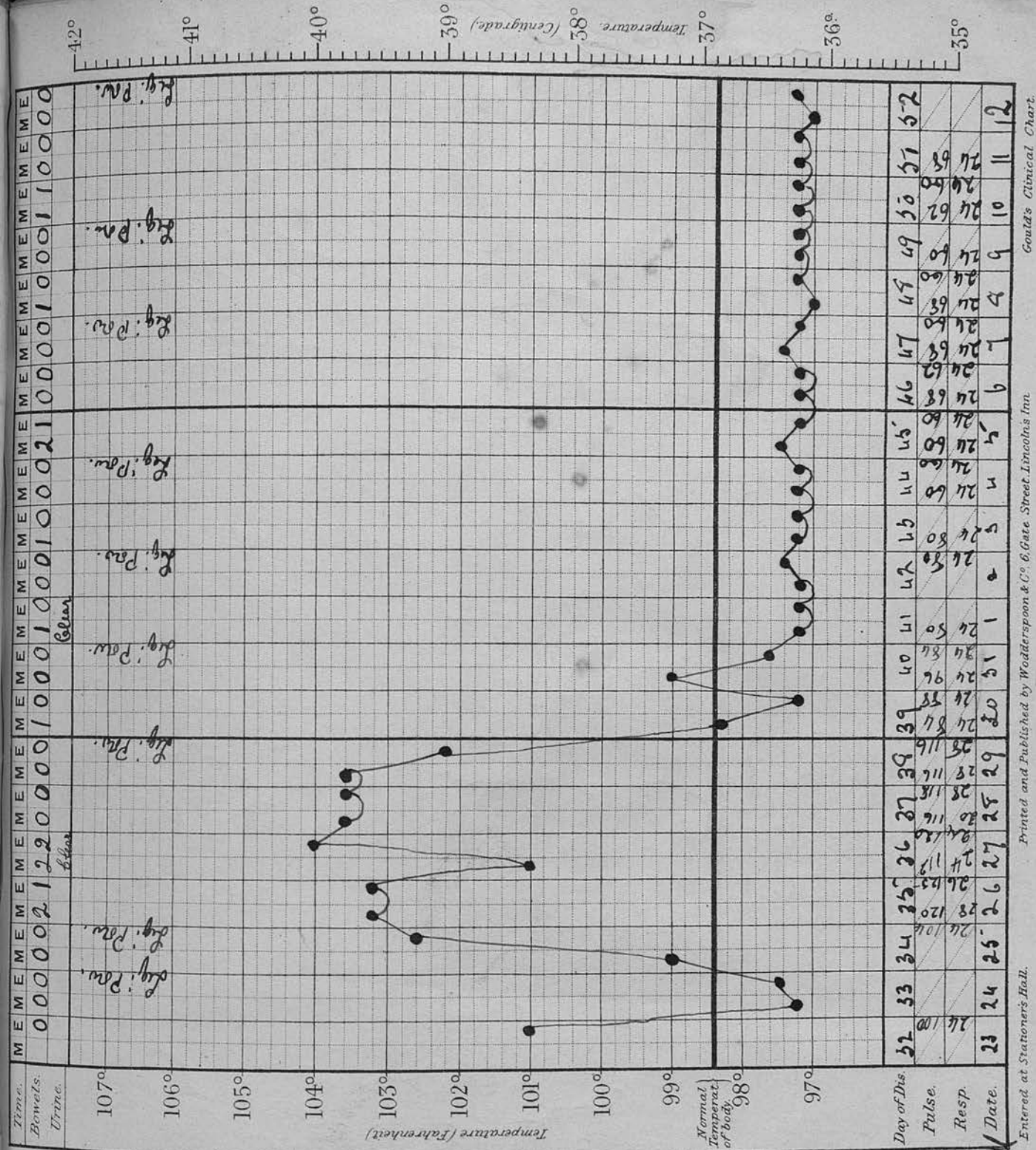
*Notes of Case.*

Name Mary Taylor

Age.

Diet

Case Book No.



*Date of admission.*

Result Discharge  
Feb. 28 25



[illegible]

*Notes, of Case.*

Name - 12 Chester St. Haverly

Diet

Exact Sept. 12<sup>th</sup> -

9 now doing.

Paul sees same day.

*α depoheteria*.

Bridal-rash over

[illegible]

study. Civ. Serv.

enlarged.

Discharged

Result from 19. 05.

*Printed and Published by Widderspoon & Co. 6, Gate Street, Lincoln's Inn*

*Gould's Clinical Chart*

DISEASE.

Notes of Case.

Frank Hancock

Name

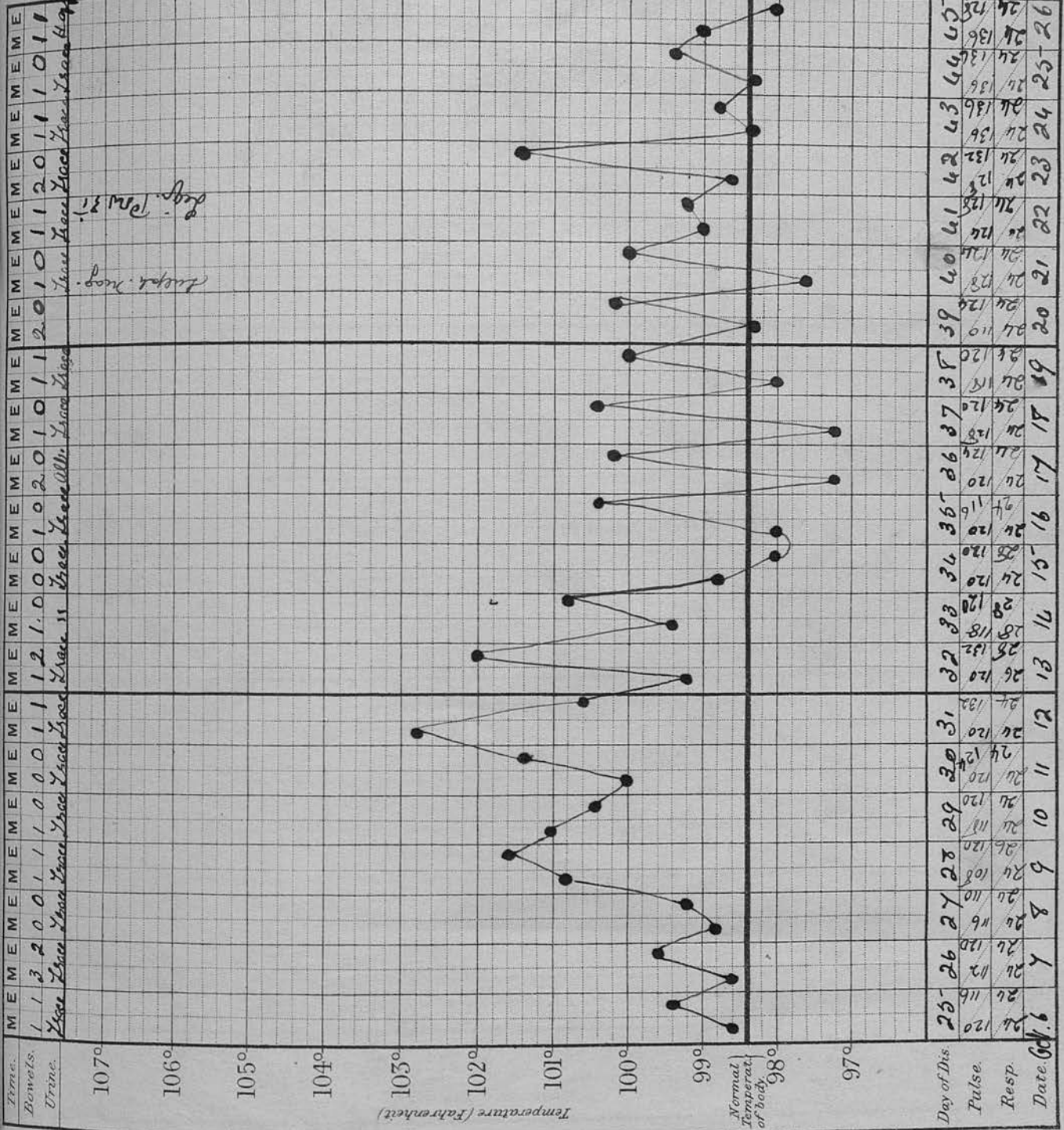
Age

Sex

Case Book No.

Date of admission.

Result





DISEASE.

Notes of Case.

Name { L. Hancock

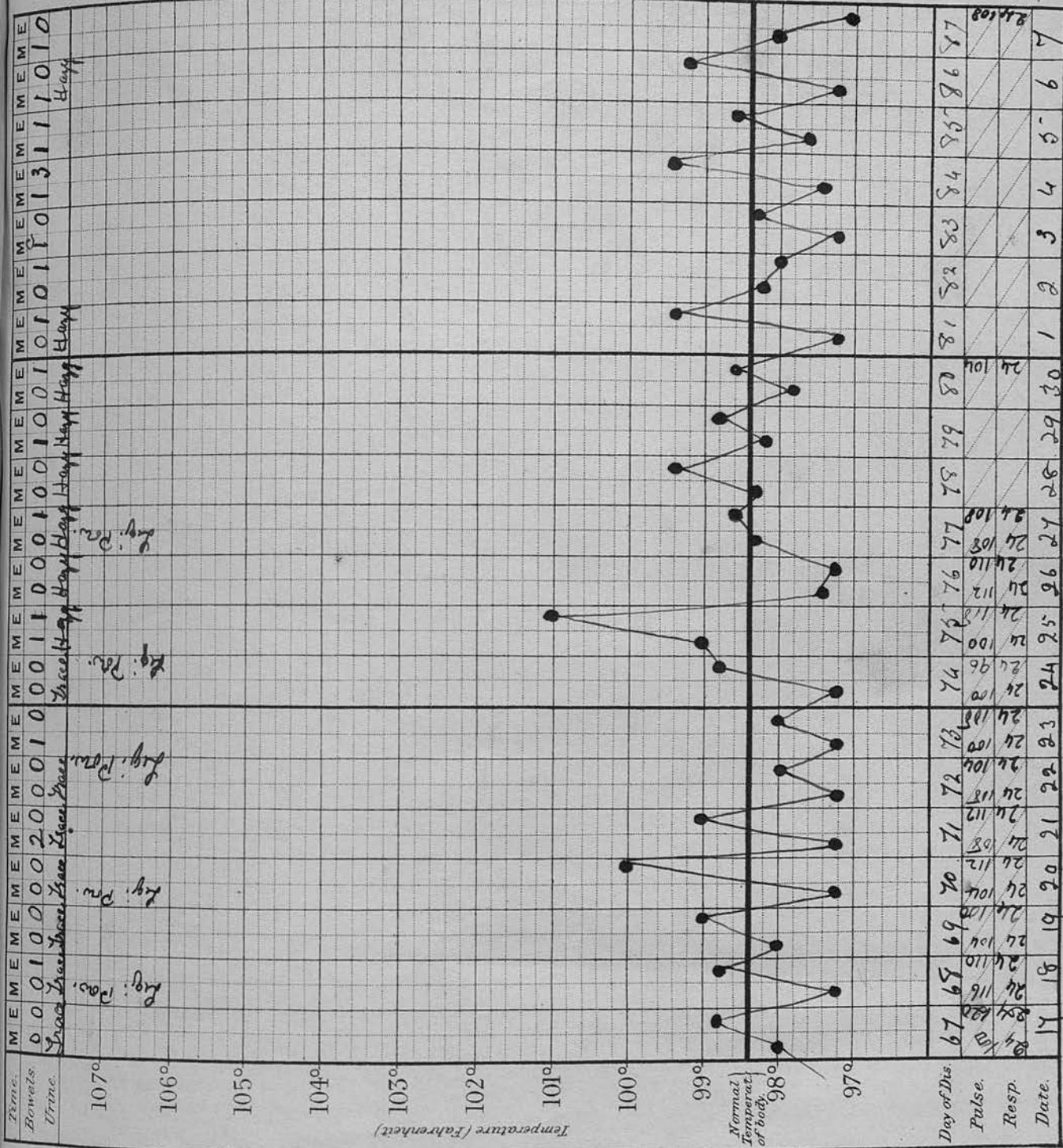
Age

Diet

Case Book No.

Date of admission.

Result





*Notes of Case.*

W. Hancock

Name-

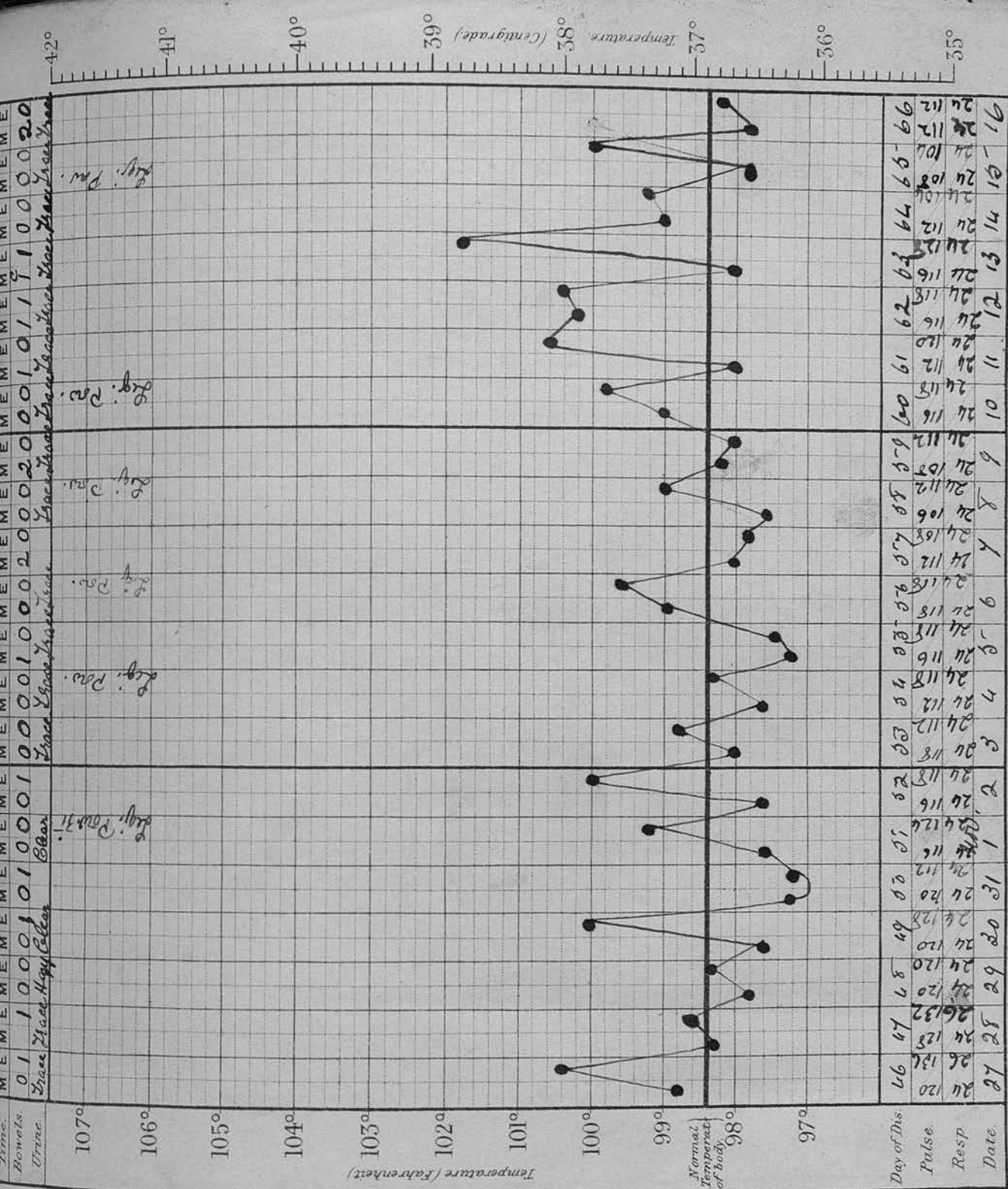
Age

Diet

Case Book No

Date of admission.

## Result



Entered at Stationer's Hall.

Printed and Published by Widderspoon & Co. 6 Gate Street, Lincoln's Inn.

Gould's Clinical Chart

# DISEASE.

## Notes of Case.

Name Arthur Goodwin

Age 4 yrs.

Diet Protein

Case Book No. 141200

Onset Jan. 27<sup>th</sup> with

for throat & vomiting

Prod. 28<sup>th</sup>

Has had measles

Prod. by Dr. Anderson

Throat swollen & dark

looking. Membranous

patch on inner border.

Rash very well marked

on chest & neck.

Word rather. Heart.

well marked pulsation

& small systolic murmur.

Result died 31<sup>st</sup> Jan - 1885

Date of admission.

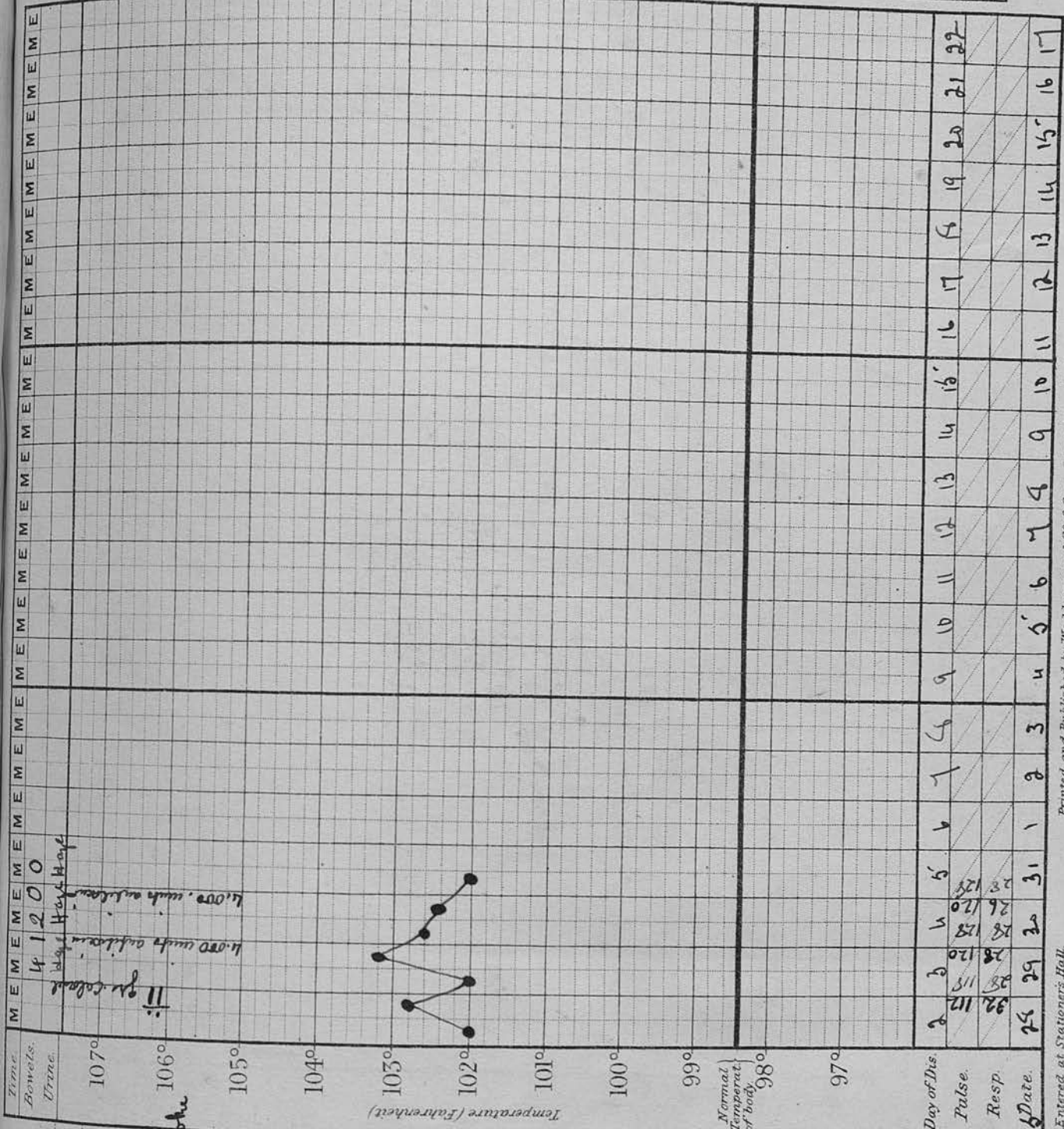
24<sup>th</sup> Jan - 1885

Result died 31<sup>st</sup> Jan - 1885

Entered at Stationer's Hall.

Printed and Published by Woaderspoon & Co. 6, Gate Street, Lincoln's Inn.

Gould's Clinical Chart.



DISEASE.  
Scarlet Fever.  
Stoke.

Notes of Case.

Name { Elizabeth Thie  
43, Stoke Road.

Age 4 Years

Diet Protestant.

Case Book No.

Onset: Nov. 30<sup>th</sup> with

sore-throat, headache,

7 rash.

9<sup>th</sup> at Dr. Gaury.

P. J. Haslewood W. Leigh

B.O. 4<sup>th</sup>

on admission.

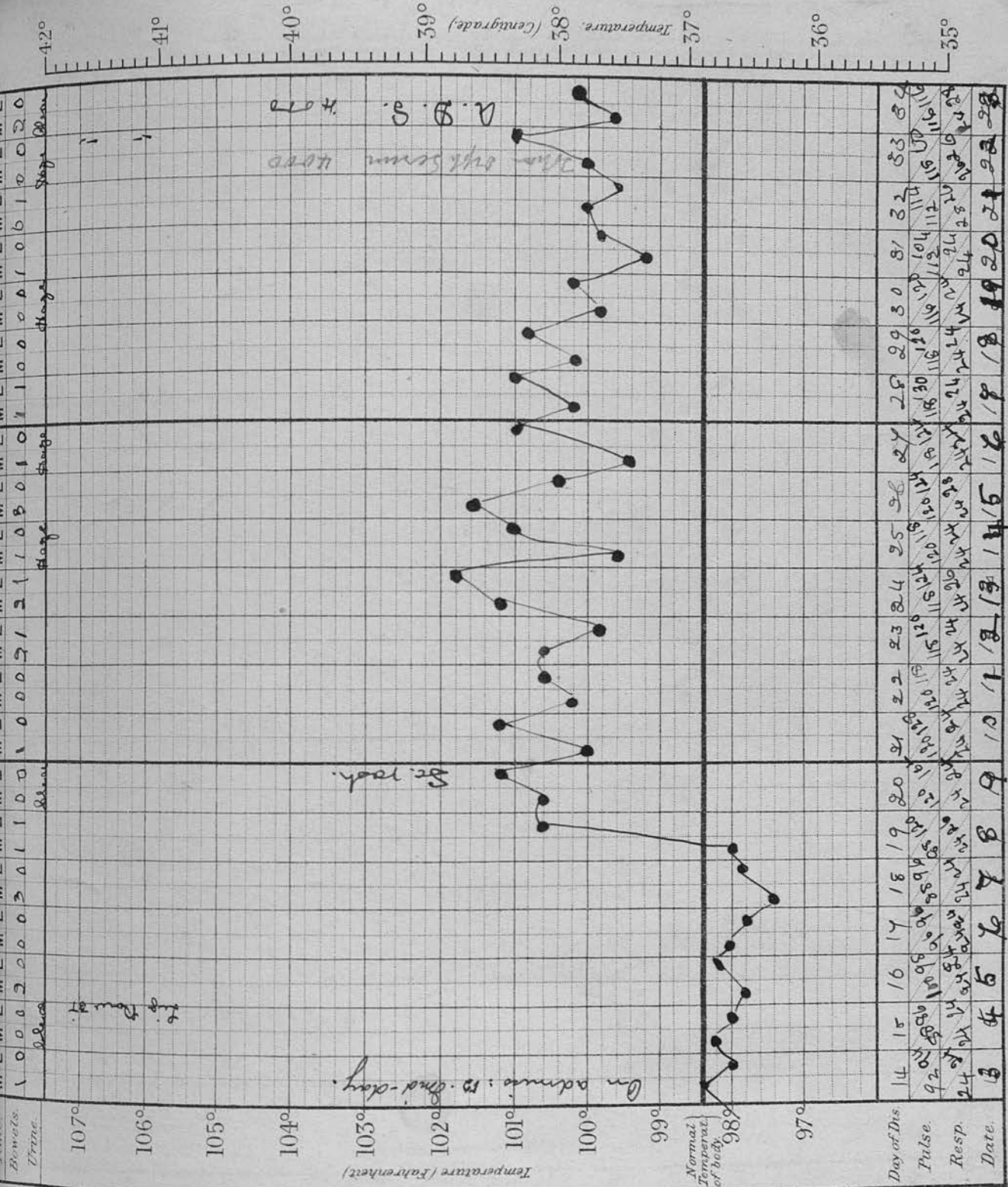
No rash or  
Desquamations.

Am. of L. Sh. enlarged.

Date of admission.

3. 12-04

Result



Entered at Stationer's Hall

Printed and Published by Waddespoon & Co. 6, Gate Street, Lincoln's Inn.

Gould's Clinical Chart.



DISEASE.

Scarlet Fever  
Gleak

Notes of Case.

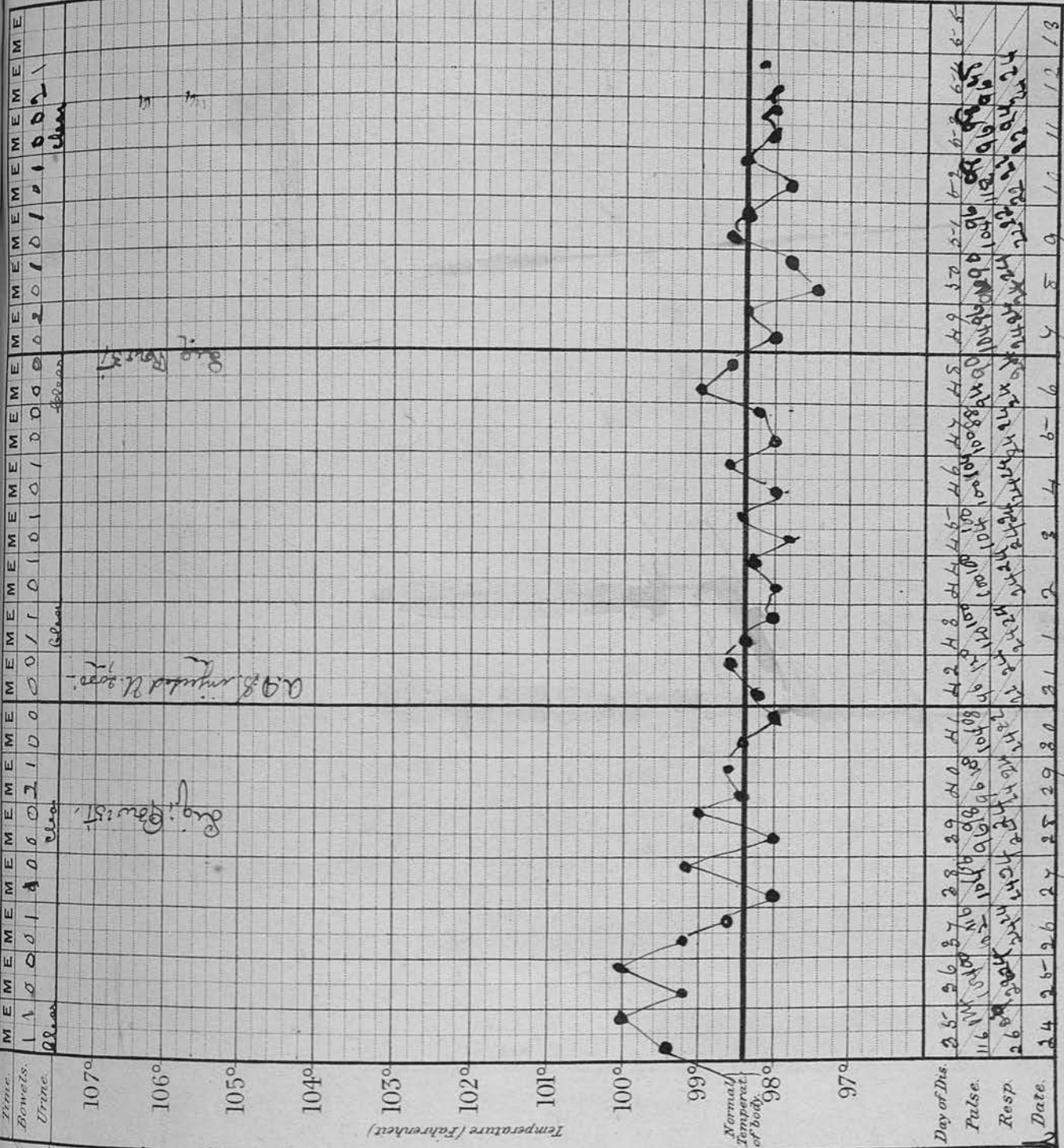
Elizabeth Rice

Name, 40 Stoke Rd

Age 4 years

Dist. Protestant

Case Book No.



Date of admission.

Feb. 24

Result Discharged

Feb. 24

Entered at Stationer's Hall.

Printed and Published by Widderspoon & Co. 6, Gate Street, Lincoln's Inn.

Gould's Clinical Chart.

DISEASE.

Scarlatina  
Protonotus

Notes of Case.

Name Arthur Vaughan  
No. Victoria St. Bedford

Age 2 1/2 yrs.

Died

Case Book No.

Onset Nov. 3<sup>rd</sup> with  
vomiting. Neck append.  
Same day. Had Brucella  
3 months ago + always  
been deaf.  
Gest. by Dr. Washburn  
3 more children at home.  
1 younger + 2 older.

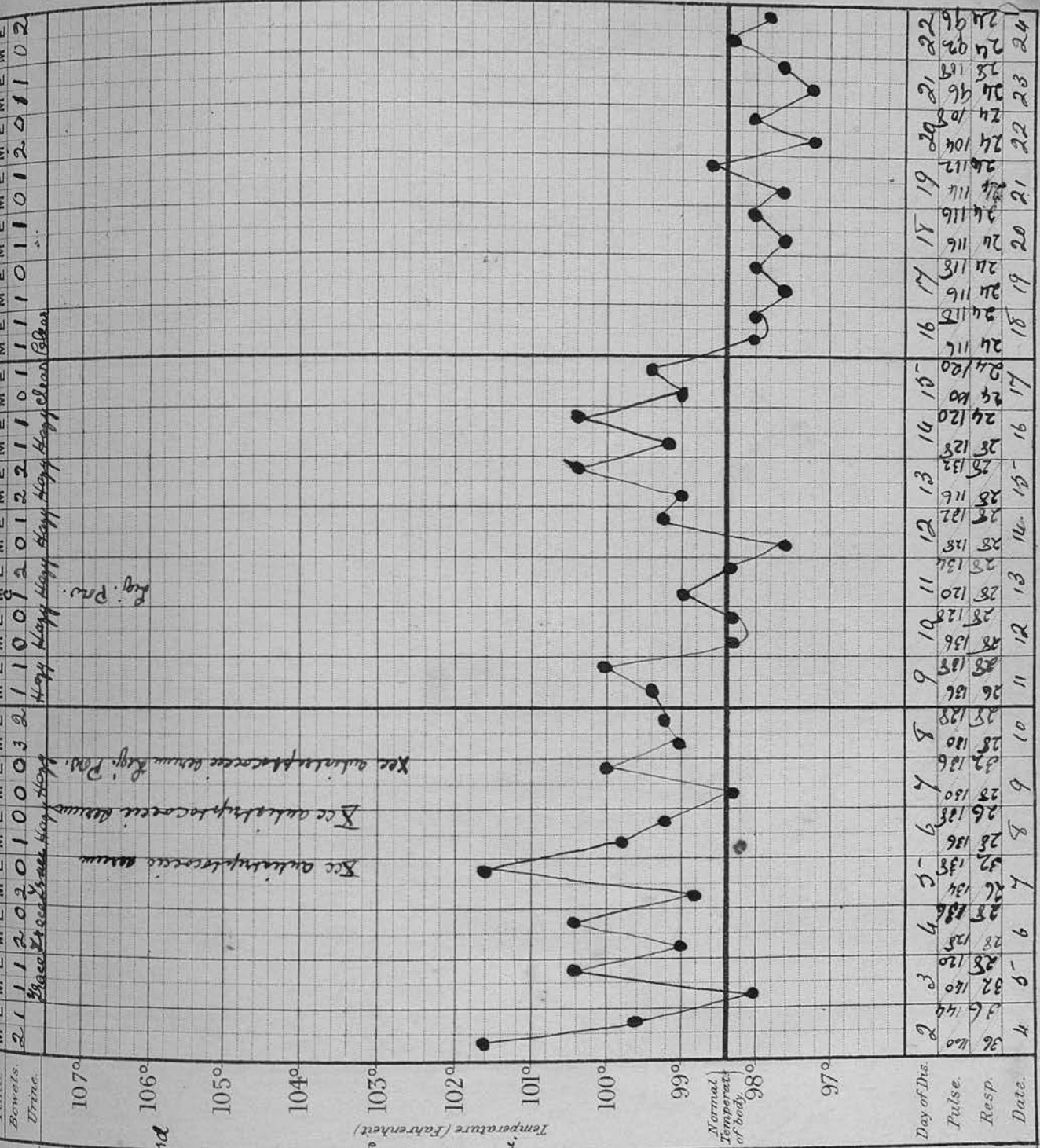
On admission.

Bright rash on  
body + limbs.  
Throat very red.  
Dropters solid.  
Loud snoring rhonchi  
both sides + just at  
back.

Date of admission.

4<sup>th</sup> Nov. 1904

Result



Entered at Stationer's Hall.

Printed and Published by Widderspoon & Co. 6, Gate Street, Lincoln's Inn.

Gould's Clinical Chart.

DISEASE.

Notes of Case.

Lilly Lloyd.

Name

Age

Diet

Case Book No.

July 20.

Rash on chest - Sore throat - Headache - Vomiting - typical Sherrin - very tongue.

July 26.

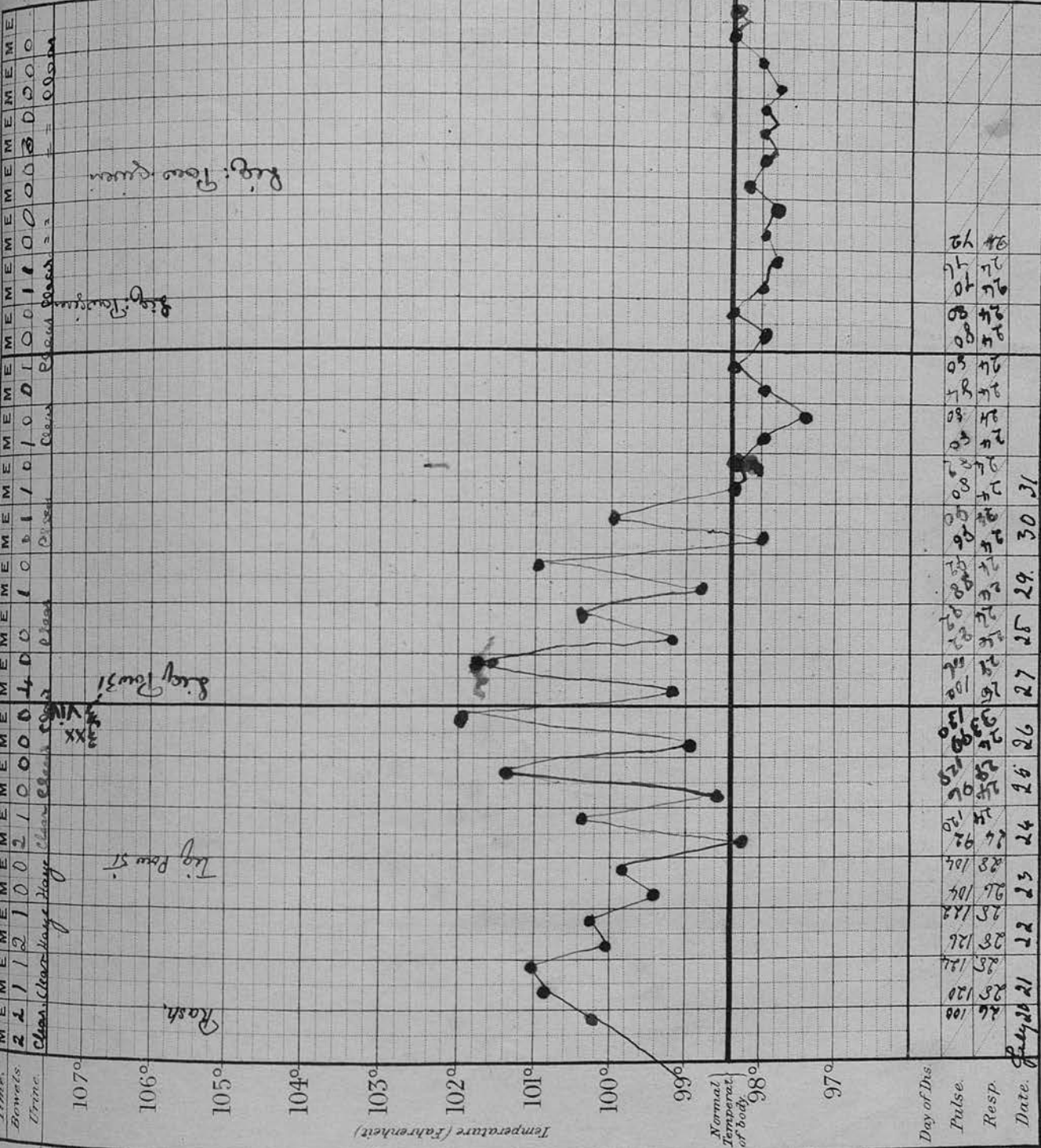
Rheumatic Pains wrist & R. elbow.

Diagnosed as per legs & hands.

Date of admission.

June 10th / 05.

Result



Entered at Stationers Hall.

Printed and Published by Widderspoon & Co. 6, Gate Street, Lincoln's Inn.

Gould's Clinical Chart.



Scarlet Fever  
46 Plough Street  
Notes of Cash

Name { Pierce  
Roberts

Age 5 years

Diet Protestants

Case Book, No.

Onset Sept 9 ch

With Headache

Love throat

Rash seen on 10<sup>th</sup>

Law by Law

in the a ch

No Previous Illness

4. more children

in house

Will - Market Week.

transido 9 Sept. - Prácti.

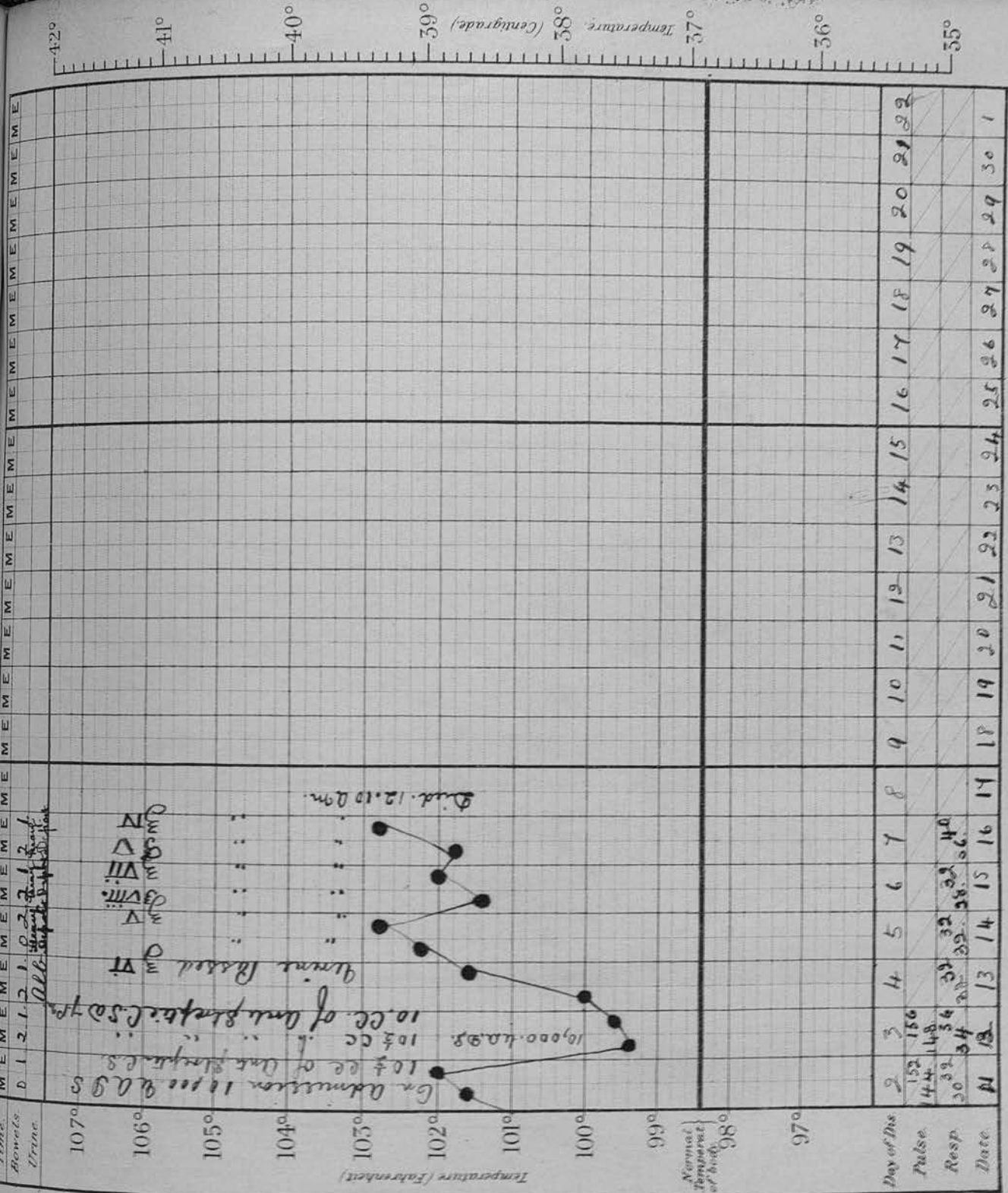
nasal discharge.

Ver. 1.0.0.0

*Date of admission.*

Sept. 10. 1896

## Result



Entered at Stationers Hall.

Printed and Published by Widderspond & Co. at Gate Street, Leeds, for

*Gold's Clinical Chart*

DISEASE.  
Scarlet Fever  
12 Gordon St  
Notes of History.

Name { Mary  
Stallan

Age 7 yrs

Diet milk

Case Book - 11

Admitted July 19<sup>th</sup>

more throat &

vomiting at

March 20<sup>th</sup>

1st Indigestion 20

19<sup>th</sup> in earthen

infant.

Well marked rash

all over body -

bursts upper lip.

Strawberry tongue

clearing a little

limbs clean, ves

enlarged

July 25<sup>th</sup>

Rheumatic pain

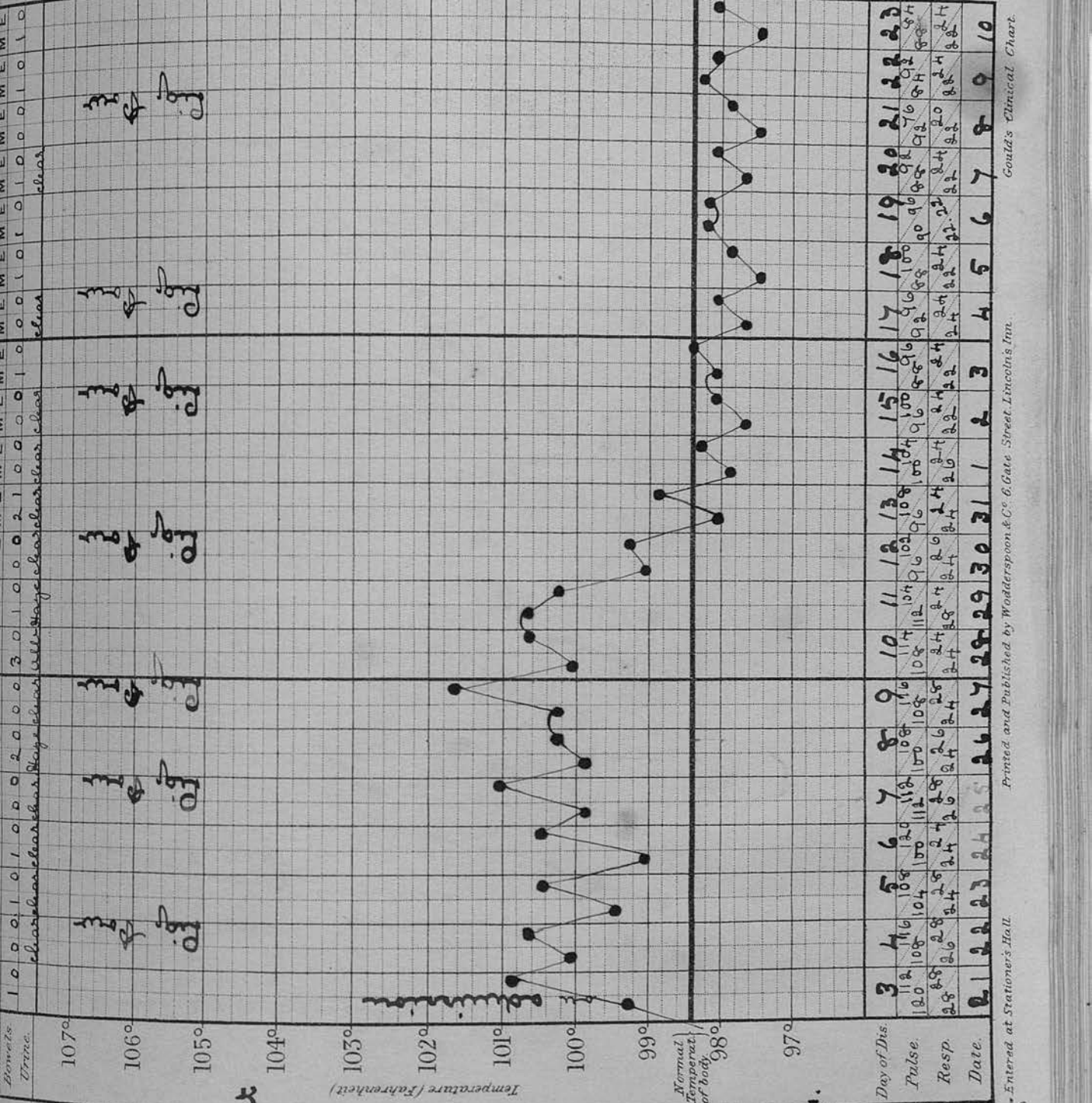
in wrists & ankles.

Date of admission.

July 21<sup>st</sup>

Result Discharged

Sept 14<sup>th</sup> 1905



Entered at Stationer's Hall.

Printed and Published by Widderspoon & Co. 6, Gate Street, Lincoln's Inn.

Gould's Clinical Chart.

Beattie, Finner

Flannery

Notes of Case.

Arthur Ratelle

Name 30 Brighton St.

Age 3 years

Prof. Boston

Case Book No.

Unsel-March 1st

with vomiting

Rash same day

few 3rd Swollen

March 2nd

Measles one year ago

Whooping cough

4 months ago

Well marked Ears.

Skin exposed.

Well marked

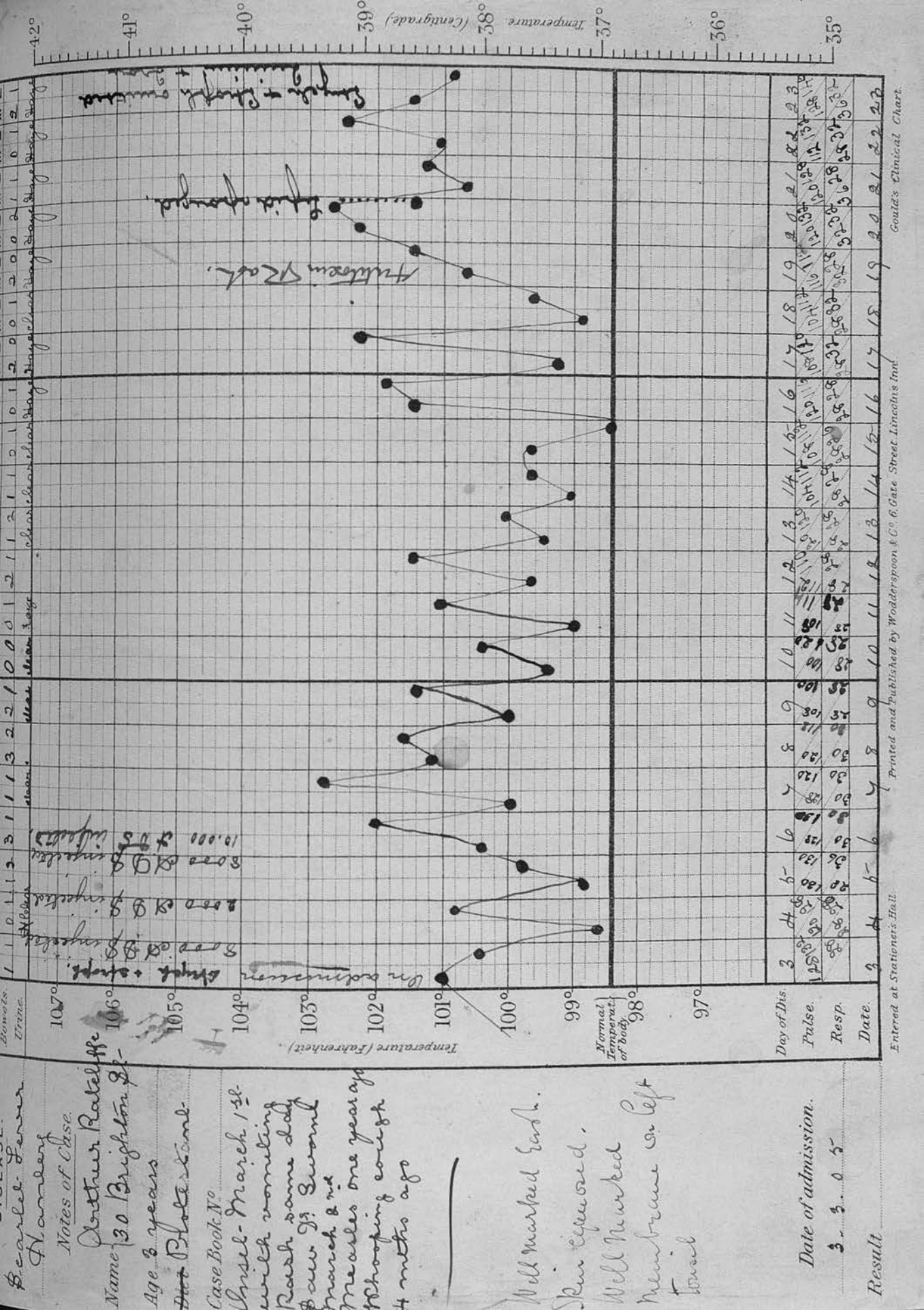
Membrane on left

Tonsil

Date of admission.

3. 3. 0 5

Result





Scarlet & Ann

*Notes of Case.*

Name { Arthur  
Patcliffe  
 Age 23 yrs  
 Diet

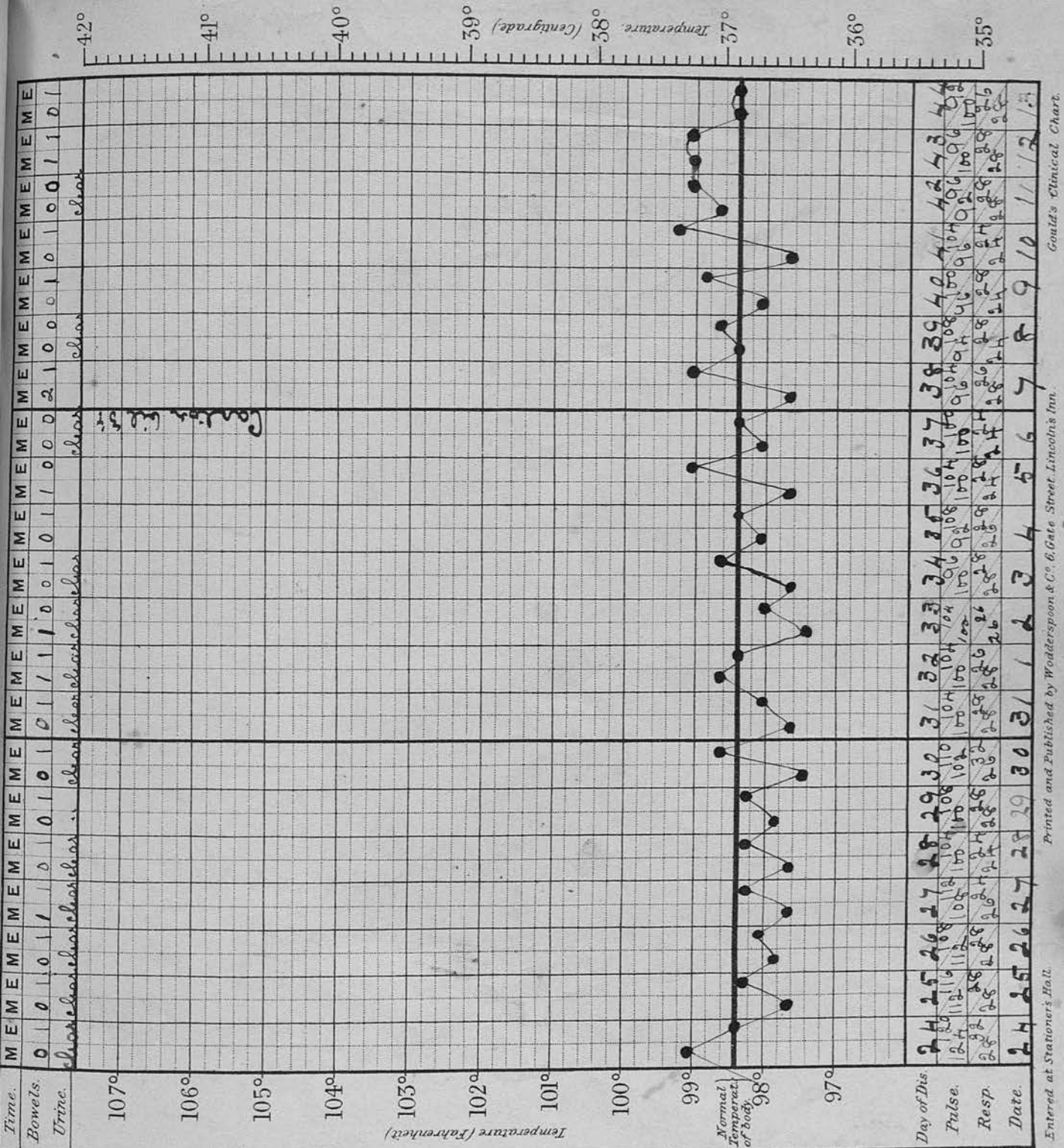
Diet

Case Book No.

*Date of admission.*

3-2-19

## Result



It



Case Book No.

*Date of admission.*

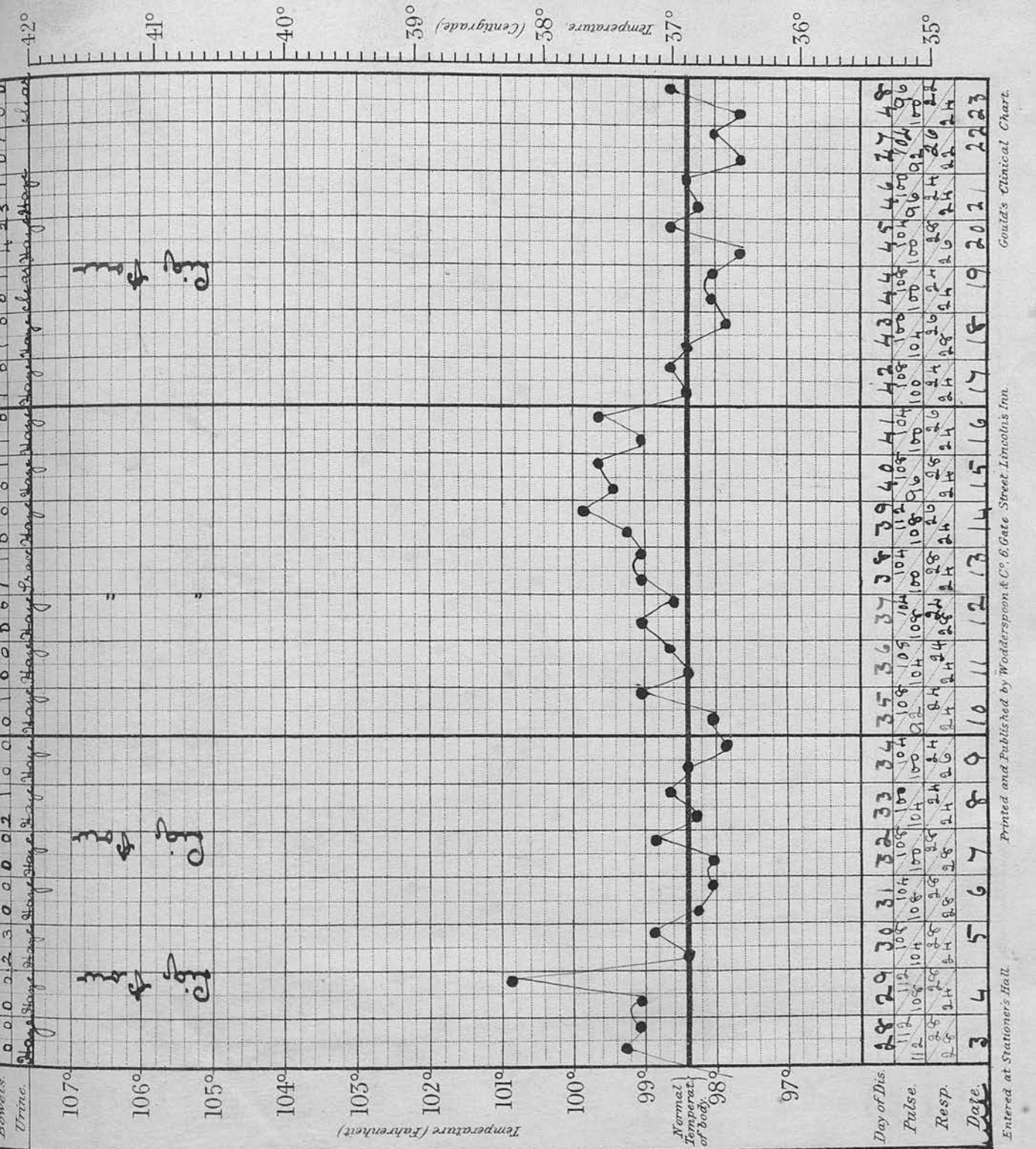
30

## Result

*Entered at Stationer's Hall.*

*Printed and Published by Widderspoon & Co., 6, Gate Street, Lincoln's Inn.*

*Gould's Clinical Chart.*





DISEASE.

Scarlet 7 over  
72 to neck small  
by ~~Miss W. F. Good~~  
C. Good

James William Clarke

Age 31/2 yrs

Diet

Case Book No. not in tank

most April 15

with Rudolph

on plot of

Stinging.

$\frac{1}{2}$

*[Faint handwritten notes]*

3-1-19

*Deinde*

dit 3 months ago

Children

older / younger

Well marked new base

On Silver Cord. Parcel

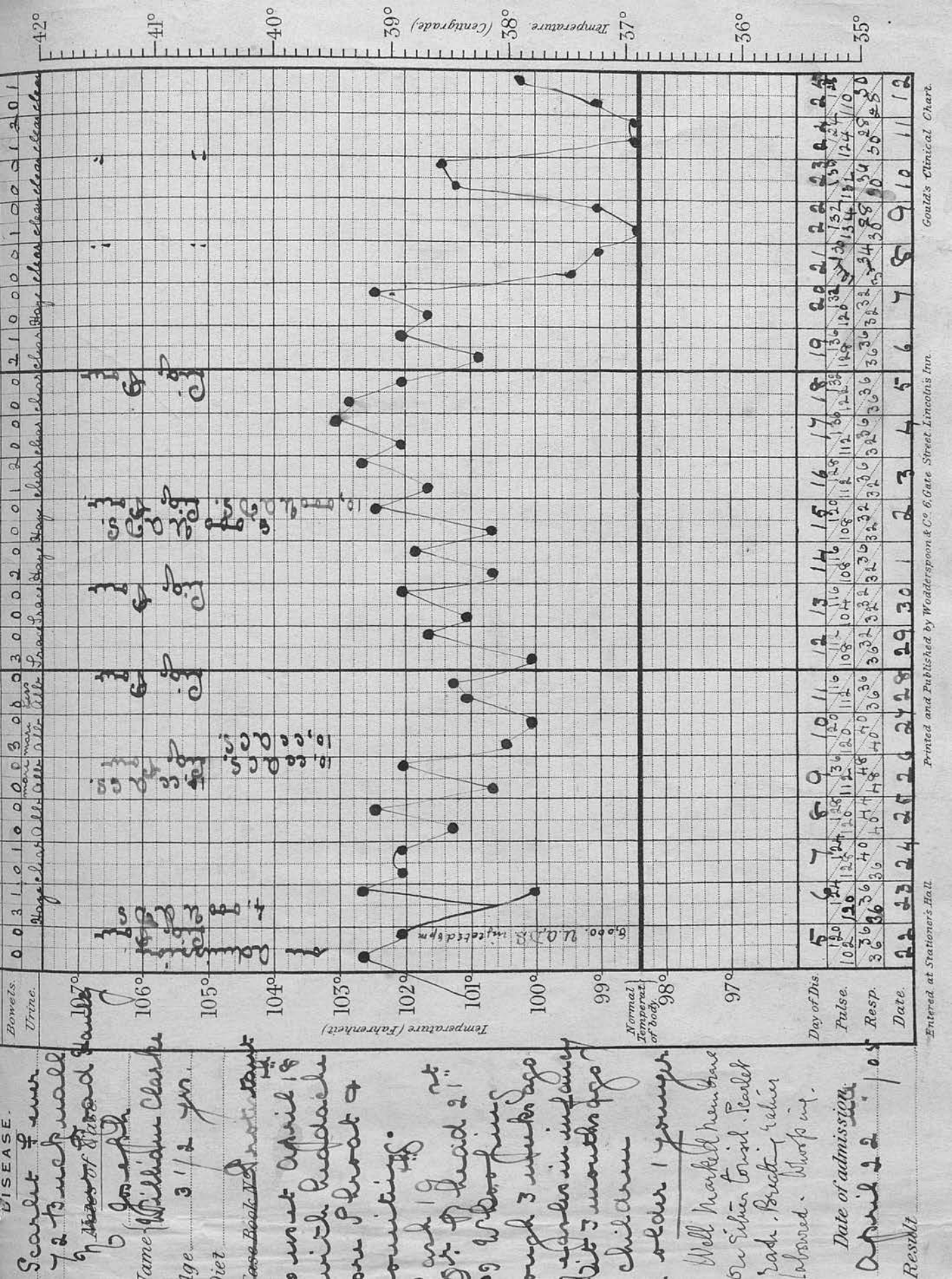
Each Breeding pair

	D
absorbed. Whorls up.	

Date of admission: 06.09.2017

Dear Sir,

## Results







DISEASE.

Scarlatina.

Notes of Case.

William Shingleton

Name 116 Wells St. H. Aubrey

Age 3 1/2 yrs.

Prof. Protestant

Case Book No.

Onst May 11<sup>th</sup> with

sore throat & vomiting

Rash appeared same

day: Has had measles

last by Dr. Davis

—

On admission.

Bright rash on

body thinks.

Throat red, swollen

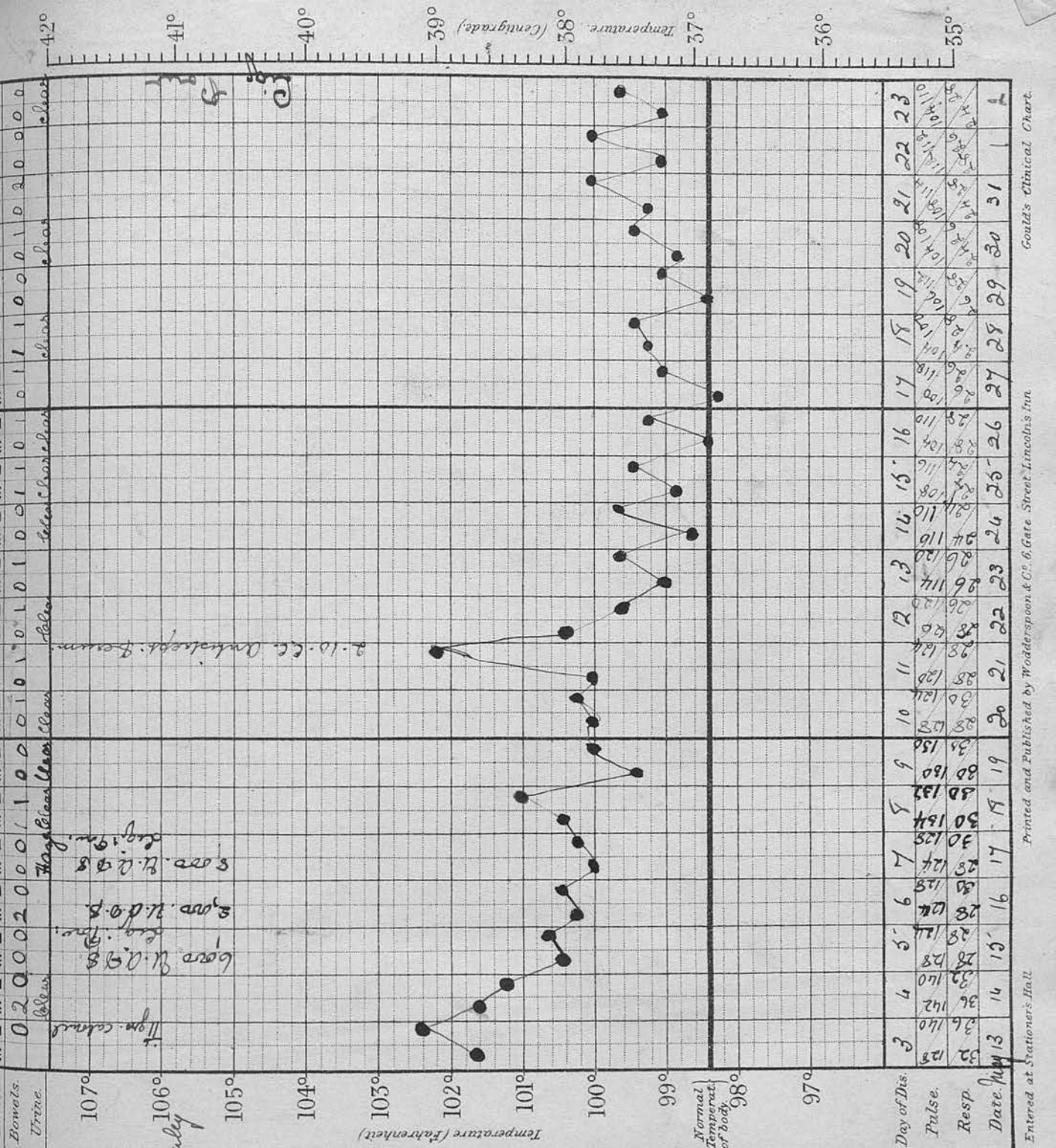
with Copious nasal

discharge.

Date of admission.

13<sup>th</sup> May 05

Result





Notes of Case.

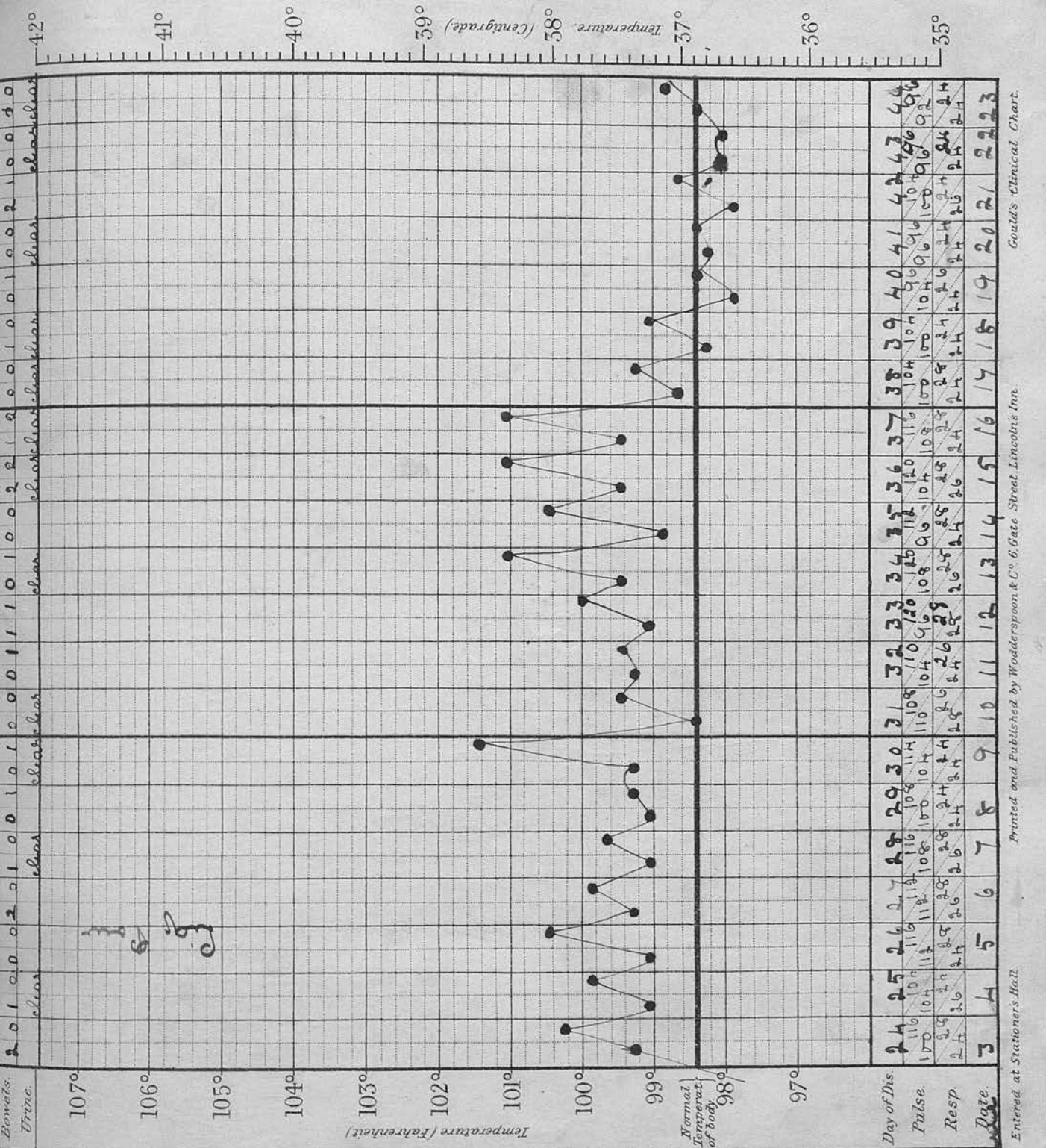
Widinau

Same *Stanger*

Age 31/2

Diet

Case Book No.



*Date of admission.*

3-05

11

charged

*Entered at Stationer's Hall.*

*Printed and Published by Widderspoon & Co. 6, Gate Street Lincoln's Inn*

*Gould's Clinical Chart.*

DISEASE.  
Scarlet-Fever  
& Diphtheria

Notes of Case.

Mary Styles

Name 54 Tr. of Edgar St.

Age 12 years

not R. L.

Case Book # Hamley

Unsel. March 6<sup>th</sup>

With sore throat

Headache & vomiting

Saw Dr. Clare March 6<sup>th</sup>

No A. D. S. No

Epistaxis. Rash

March 7<sup>th</sup> Always

delicate, subject

to Bronchitis. One

younger child in house

large membranous patch

on ~~right~~ left hand. Slight

on right & limbs.

Se. rank on body (high)

on arm fairly

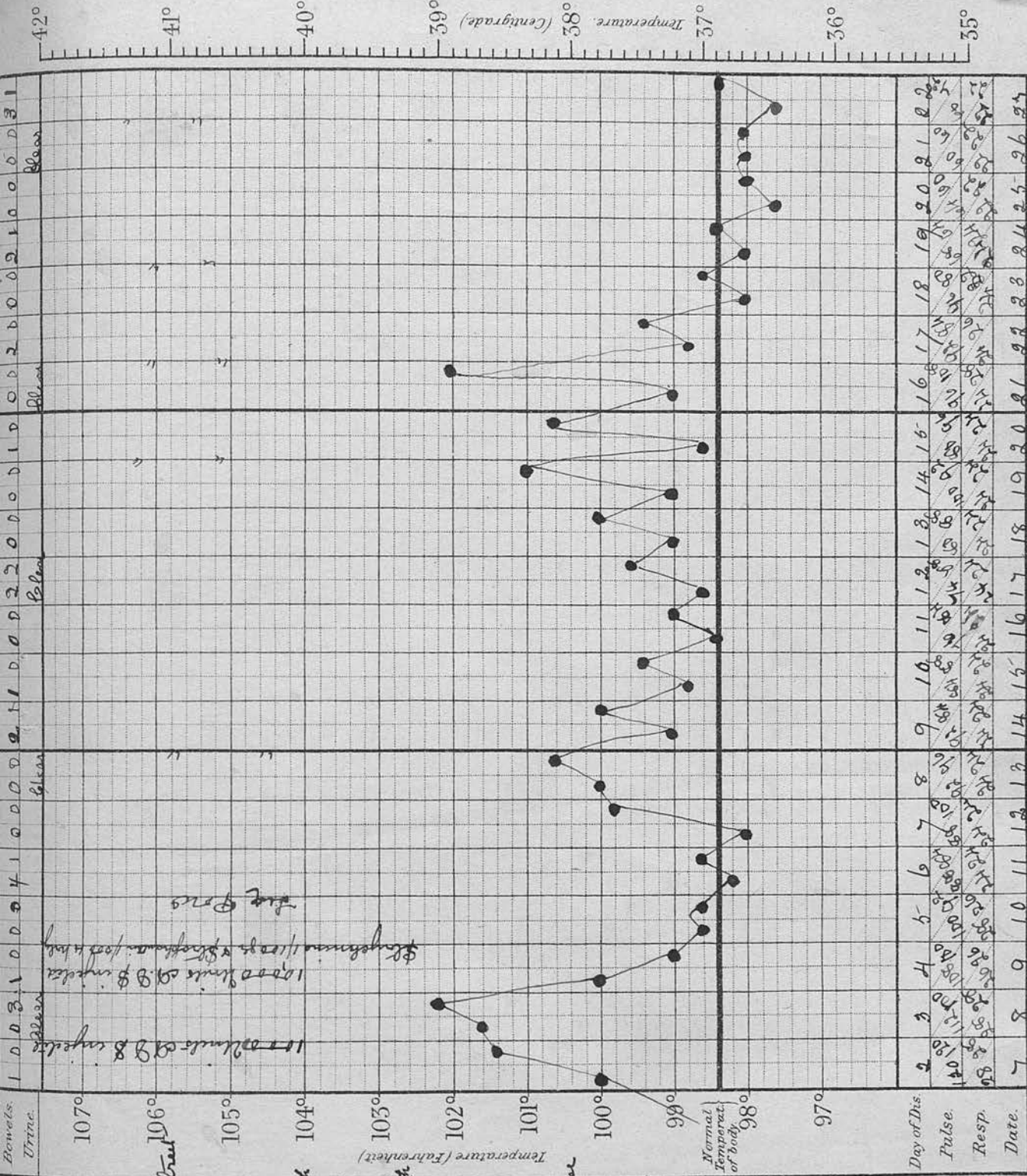
marked - Yaws

Slightly enlarged.

Date of admission.

7. 3. 0 5

Result





# DISEASE.

Scarlet Fever.

Diphtheria.

Notes of Case.

Name { Mary. Styles.

Age 12 years

Res. R. C.

Case Book No.

U. Clear 19-5-05

" Clear 27-5-05

" Clear 30-5-05

" Clear 31-5-05

" Clear 3-6-05

" Clear 9-6-05

" Clear 14-6-05

" Clear 16-6-05

" Clear 20-6-05

" Clear 24-6-05

" Clear 27-6-05

" Clear 29-6-05

" Clear 30-6-05

" Clear 3-7-05

" Clear 6-7-05

" Clear 9-7-05

" Clear 11-7-05

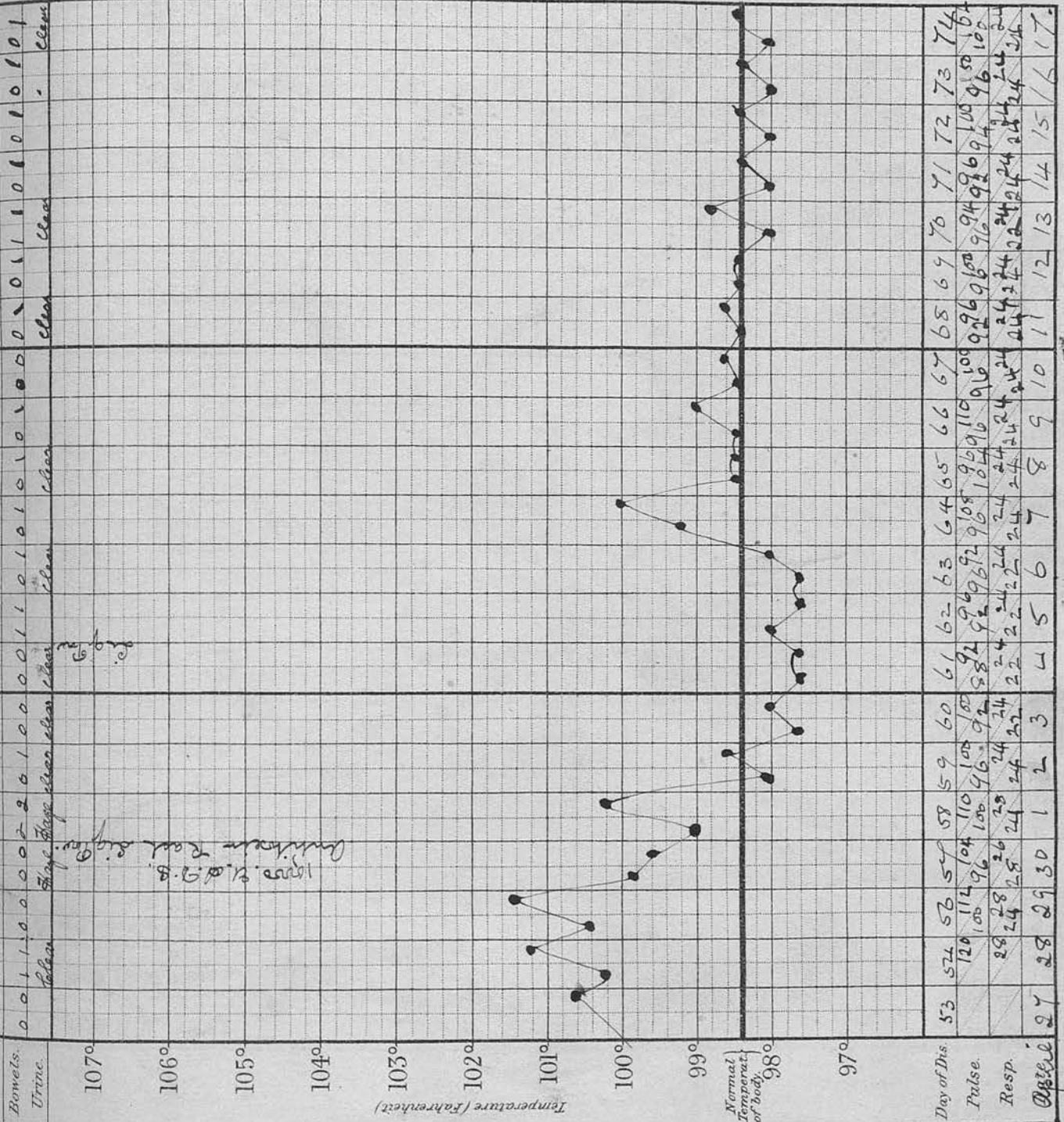
" Clear 13-7-05

Date of admission.

7-3-05.

Result Discharged

July 13<sup>th</sup> 1905.





DISEASE.

Notes of Case.

Joseph Stubbs  
Name { 104 Warrington Rd.  
Age 11 yrs.  
100 cc. Amtrich's Balm  
100 cc. Amtrich's Balm  
100 cc. Amtrich's Balm

Case Book No.

Onst May 17<sup>th</sup> with  
sore throat, headache  
vomiting. No stool seen  
same day. Has had  
dysentery. Best.  
by Dr. Green.

Will marked S. L. L.  
Most very dirty  
membrane in  
throat.

Date of admission.

14<sup>th</sup> May 05.

Result Discharged

July 13<sup>th</sup> 05.

Stomach.

Urine.

107°

106°

105°

104°

103°

102°

101°

100°

99°

98°

97°

96°

95°

94°

93°

92°

91°

90°

89°

88°

87°

86°

85°

84°

83°

82°

81°

80°

79°

78°

77°

76°

75°

74°

73°

72°

71°

70°

69°

68°

67°

66°

65°

64°

63°

62°

61°

60°

Stomach.

Urine.

107°

106°

105°

104°

103°

102°

101°

100°

99°

98°

97°

96°

95°

94°

93°

92°

91°

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67°

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61°

60°

Stomach.

Urine.

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106°

105°

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103°

102°

101°

100°

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74°

73°

72°

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62°

61°

60°

Stomach.

Urine.

107°

106°

105°

104°

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102°

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100°

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Stomach.

Urine.

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74°

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Stomach.

Urine.

107°

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75°

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64°

Scurlet Fever.

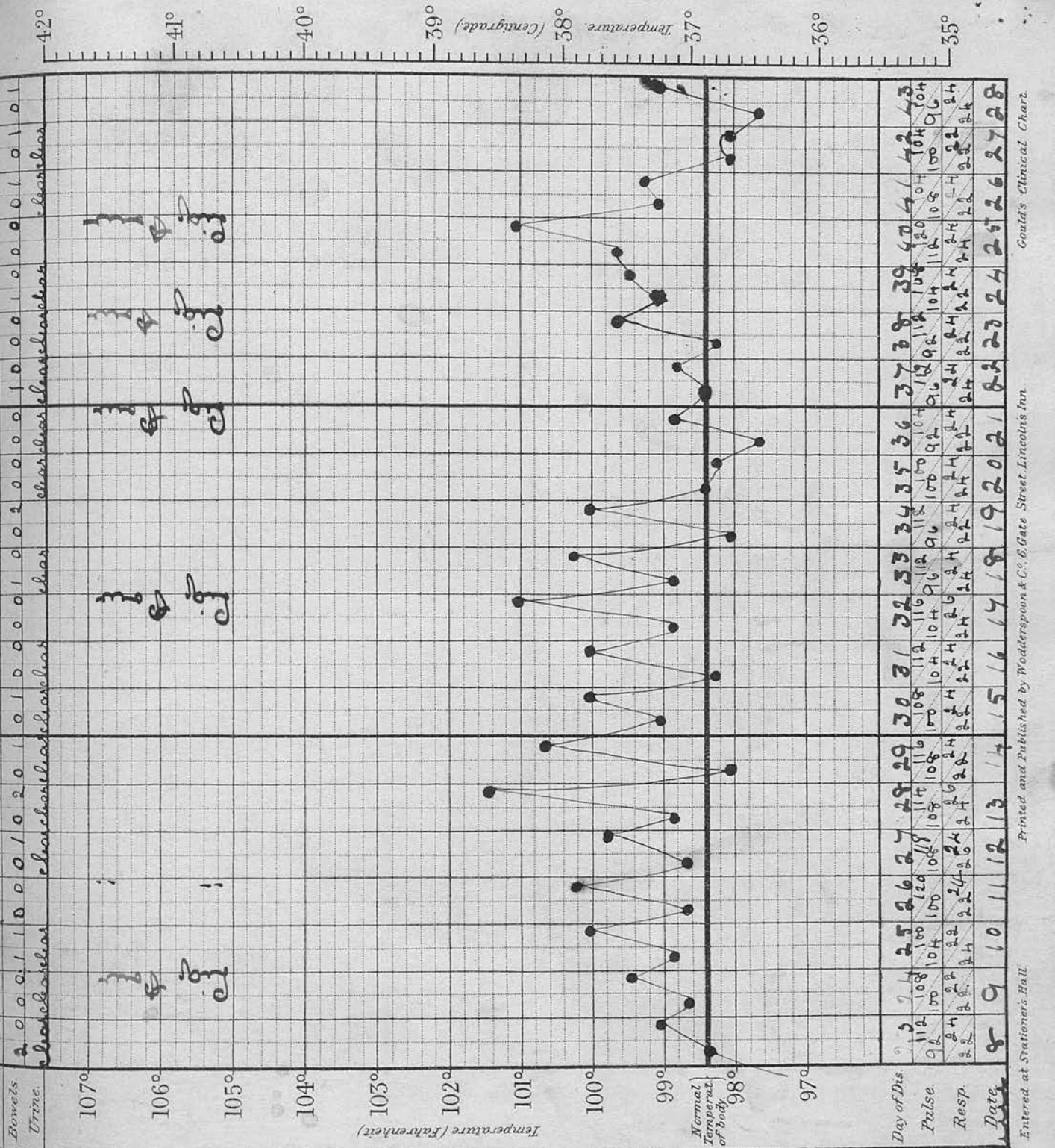
## Notes of Case

Name { Joseph Stuber

Age 11 W

Diet

Case Book No.



*Date of admission.*

May 18 1905

Result Discharged  
Sulco / 3<sup>th</sup> / 05



DISEASE.

Notes of Case.

Bernard Scott.

Name The Vicarage, Pockhull

Age 15 yrs.

Diet Protestant

Case Book No.

Onset Feb. 24<sup>th</sup> with

sore throat. Peak 26<sup>th</sup>

has had diphtheria (2)

measles & chickenpox.

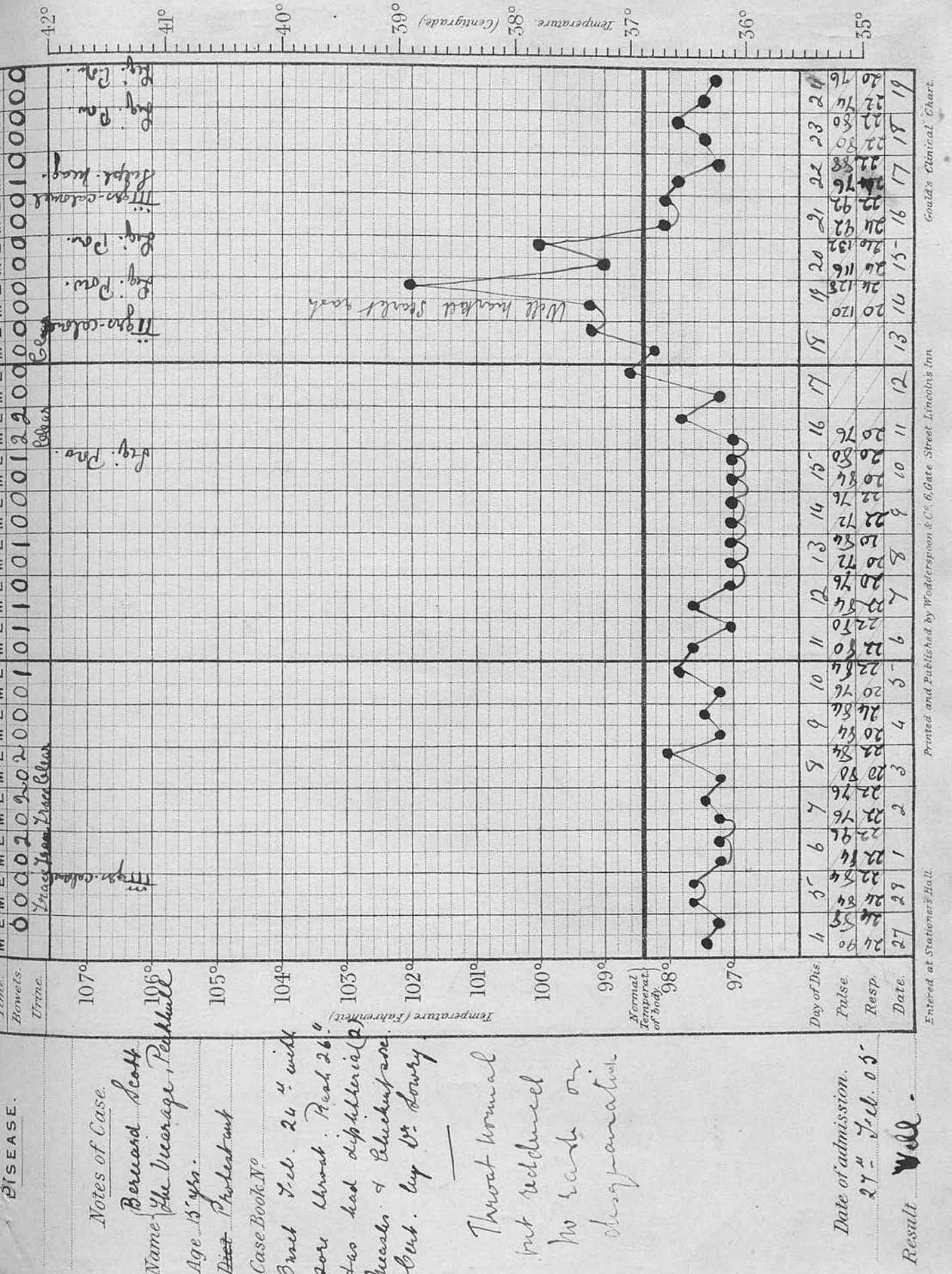
Cur. by Dr. Lowry.

Throat normal  
but reddened  
no marks on  
disjunctive

Date of admission.

27<sup>th</sup> Feb. 05

Result Well.





DISEASE.

Notes of Case.

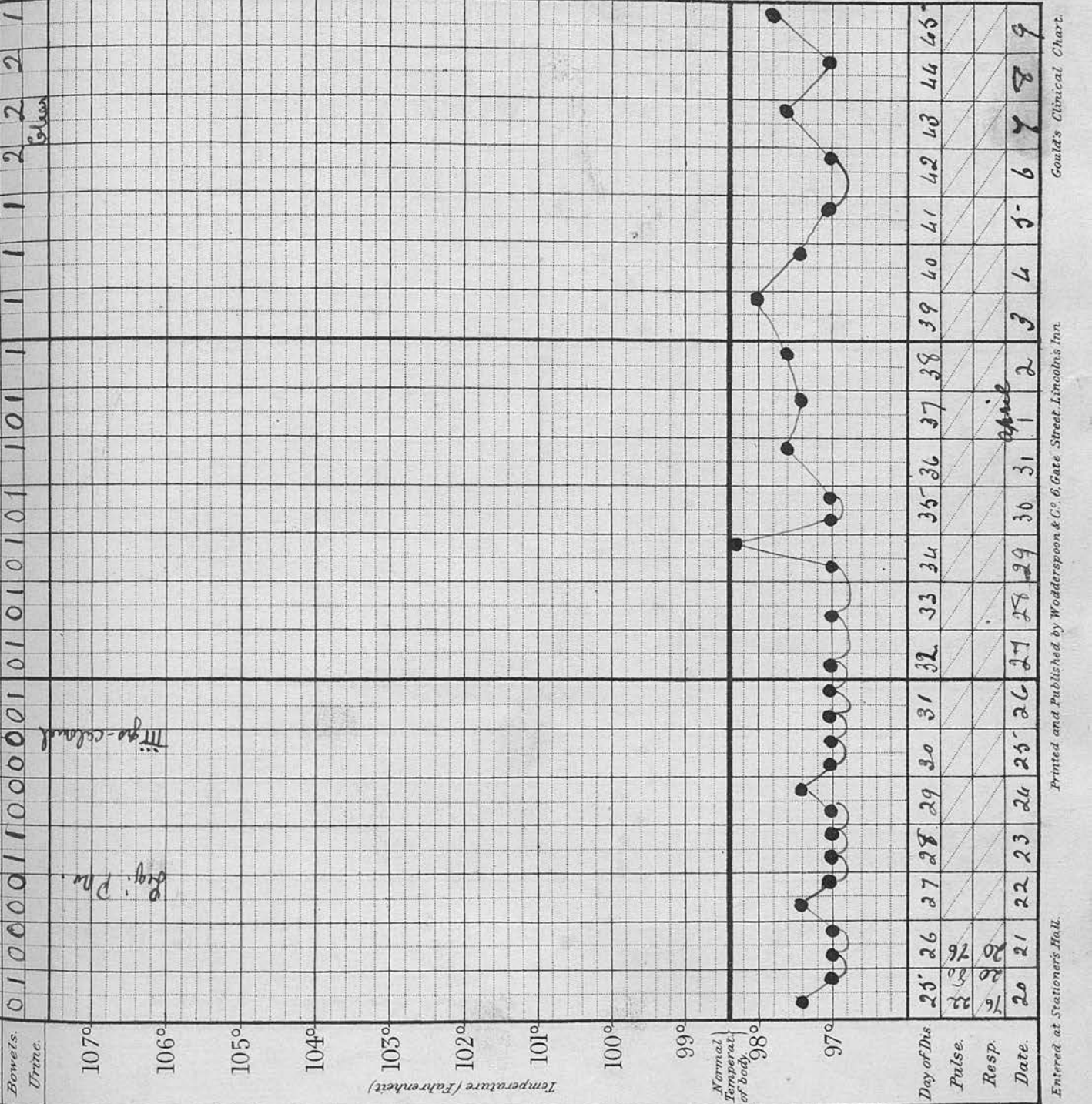
Name Bernard Scott

Age

Diet

Case Book No.

Bowels.  
Urine.



Date of admission.

Result

Entered at Stationer's Hall.

Printed and Published by Widderspoon & Co. 6, Gate Street, Lincoln's Inn

Gould's Clinical Chart.

DISEASE.  
Scarlet-fever  
Newcastle

Notes of Case.

Baron, R. Bellend

Name 7 Stanley St.

Age 12 years

112 Princes St.

Case Book No.

Unill Dec 3rd

Mild headache

Sore throat &

vomiting. Rash

P. D. Measles

Inflammation of lungs

in infancy.

Four children

older 3 younger

P. D. 2nd day

th adminis.

Bright rash on

body thinks.

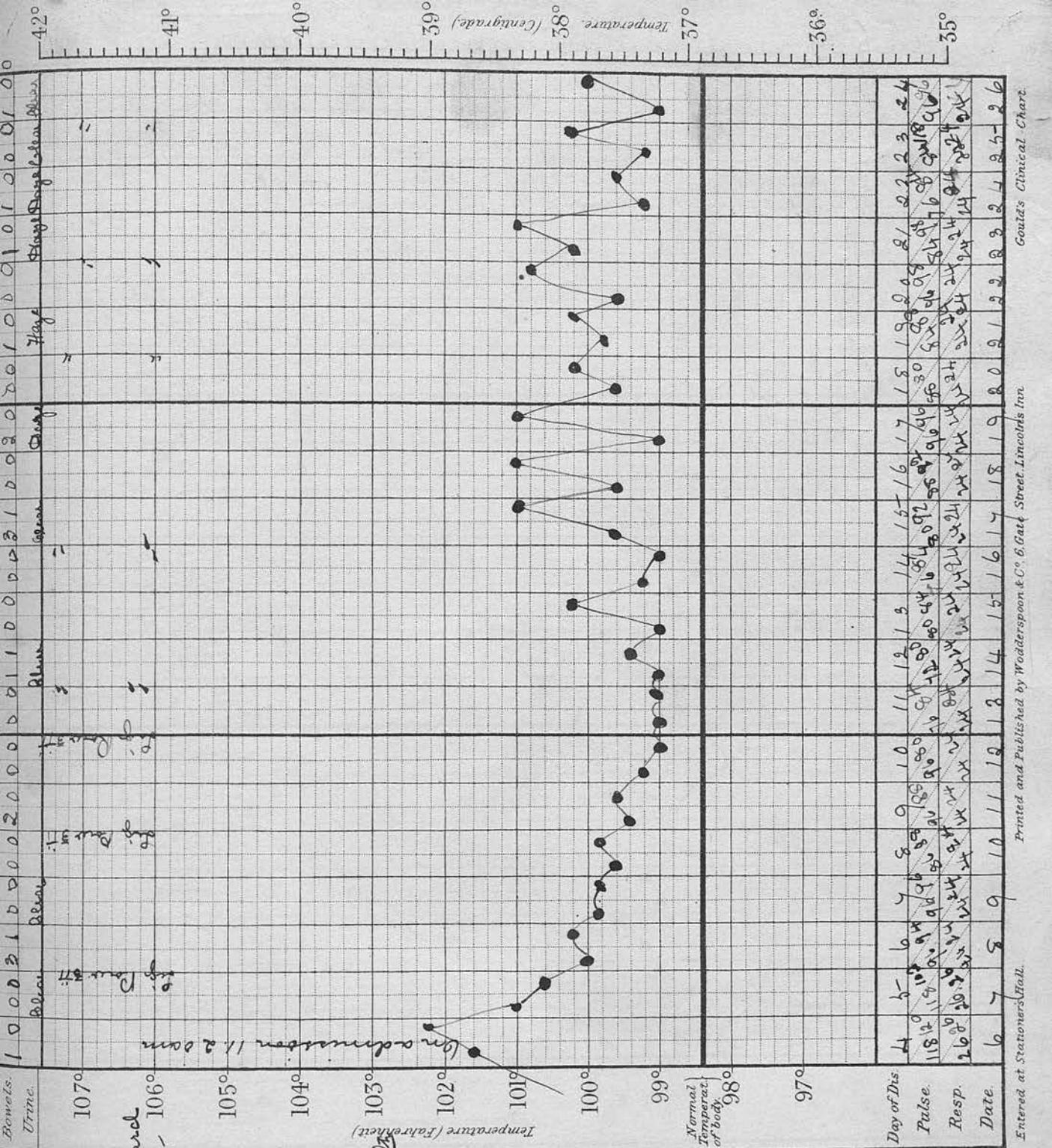
Throat & l. red &

swollen.

Date of admission.

Dec 6th 04

Result





DISEASE.  
Scarlet fever  
Newcastle

Notes of Case.

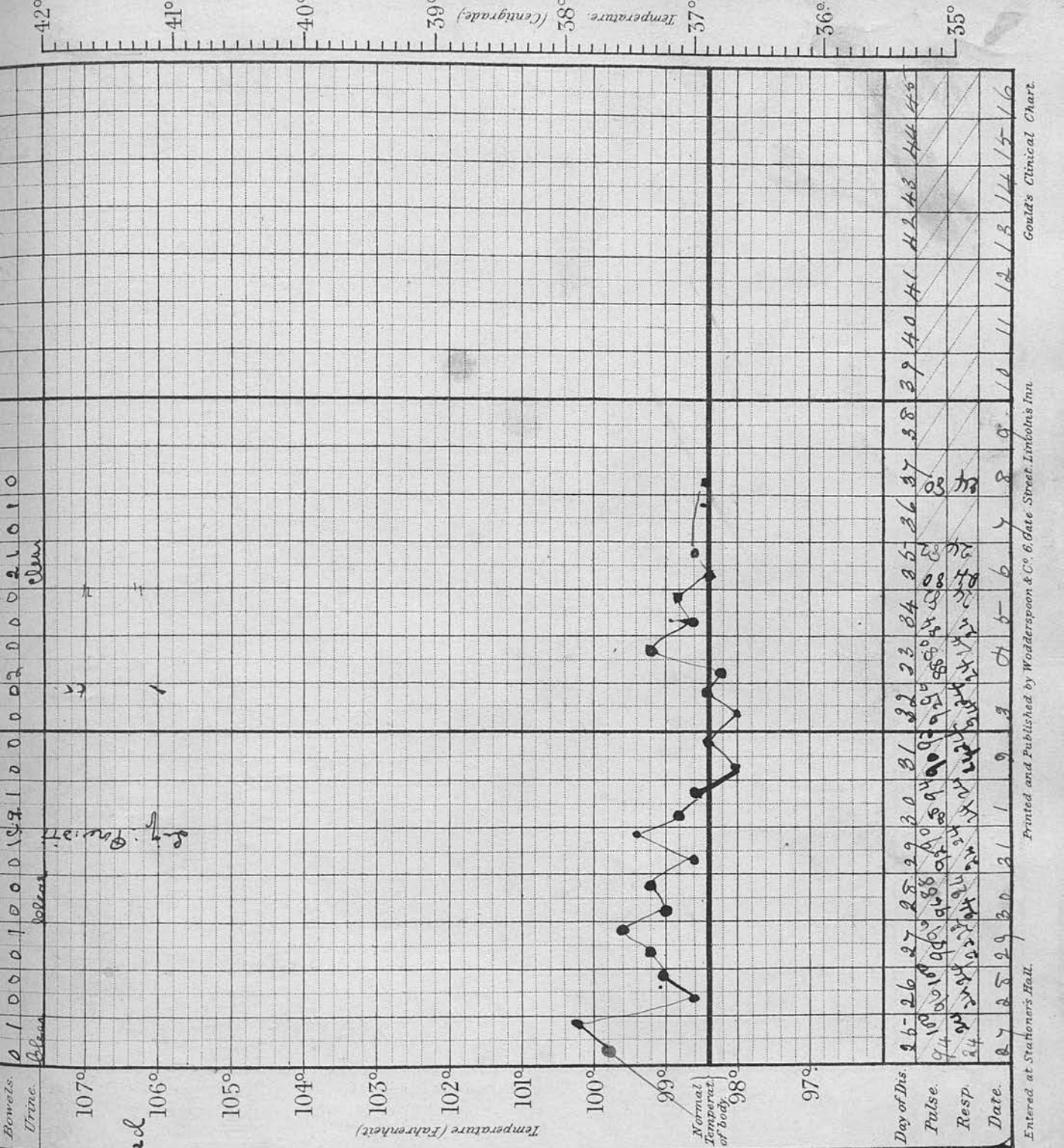
Rever. H. Bellwood

Name Stanley St-

Age 12 years

Diet Protestant

Case Book No.



Date of admission.

Dec: 6<sup>th</sup> 04

Result Discharged

Jan 3, 1905

Entered at Stationer's Hall.

Printed and Published by Wodderspoon & Co. 6, Date Street, Lincoln's Inn.

Gould's Clinical Chart.



# DISEASE.

## Notes of Case.

Name Maid Venton

Age 1 yrs.

Sex Female

Case Book No. 21

Onset Feb. 26 with

fever, blood & vomiting

Rest appeared same day

has had measles &

whooping-cough.

Care by Dr. Anderson

Patient ventrose

in earlier kind.

Well marked SE rash

& tongue discolored

ring. Heart normal.

Urine clear: spec 189

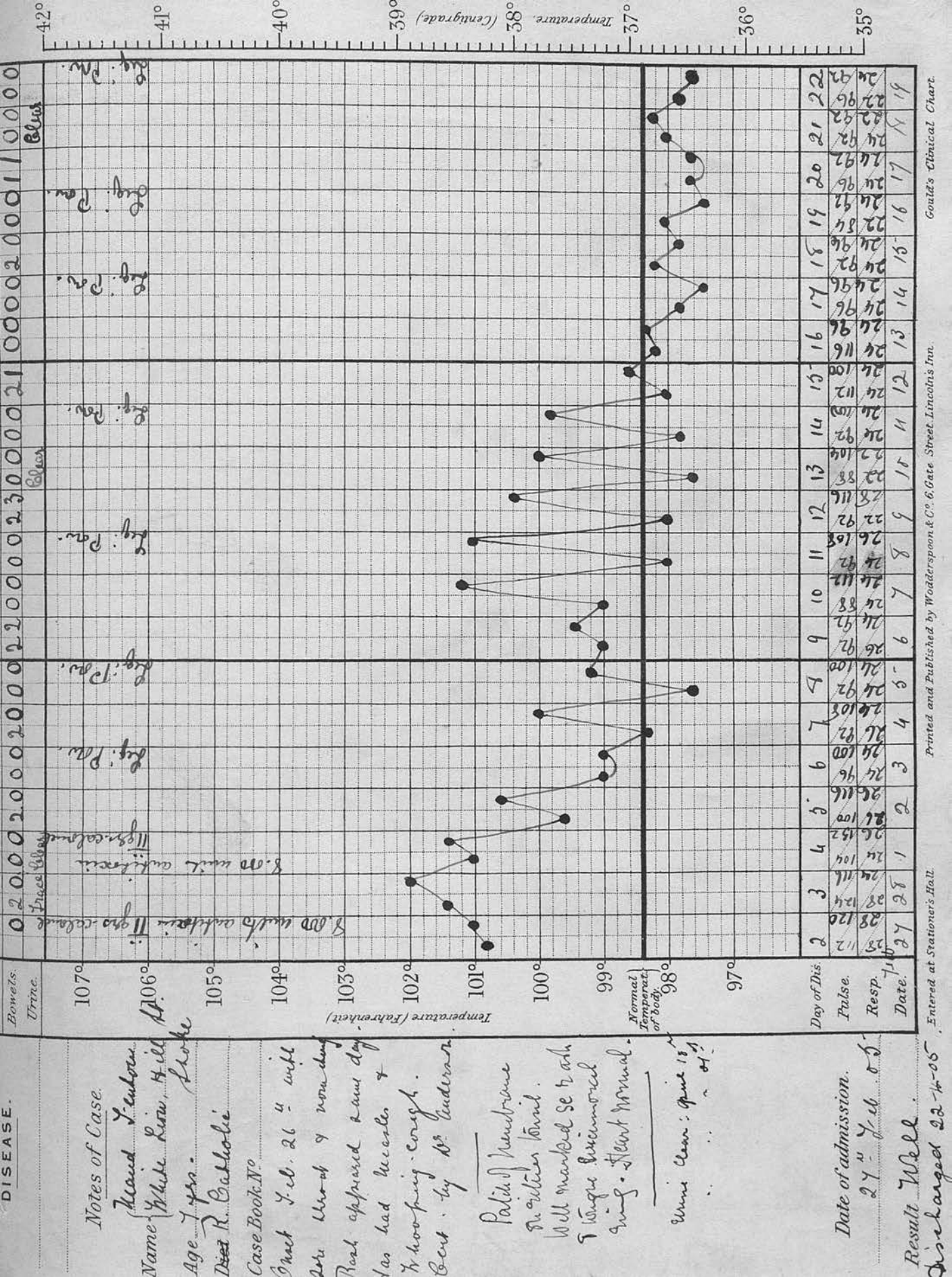
21

Date of admission.

27 Feb 05

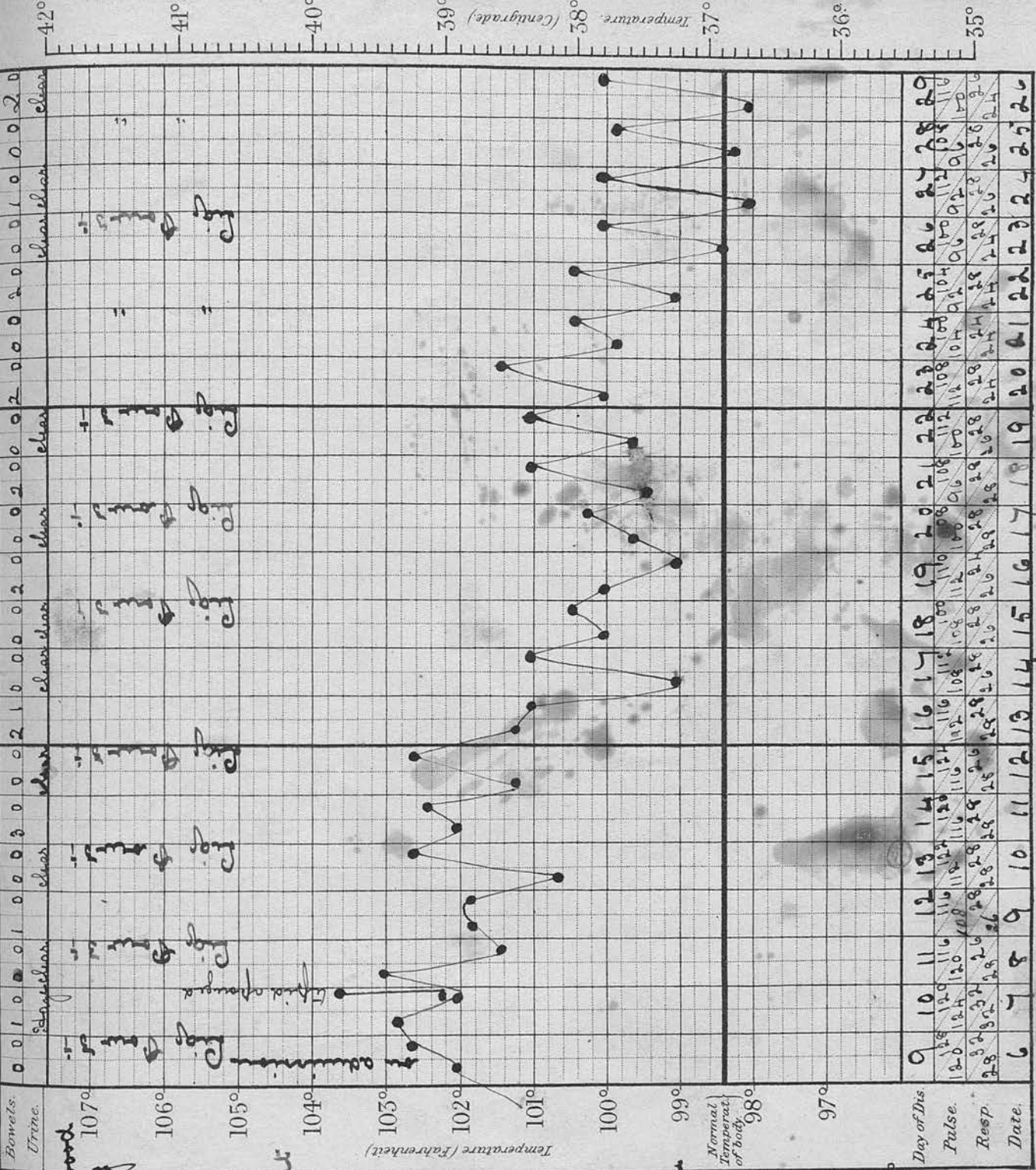
Result Well

Discharged 22-4-05



## Result

*Gould's Clinical Chart.*





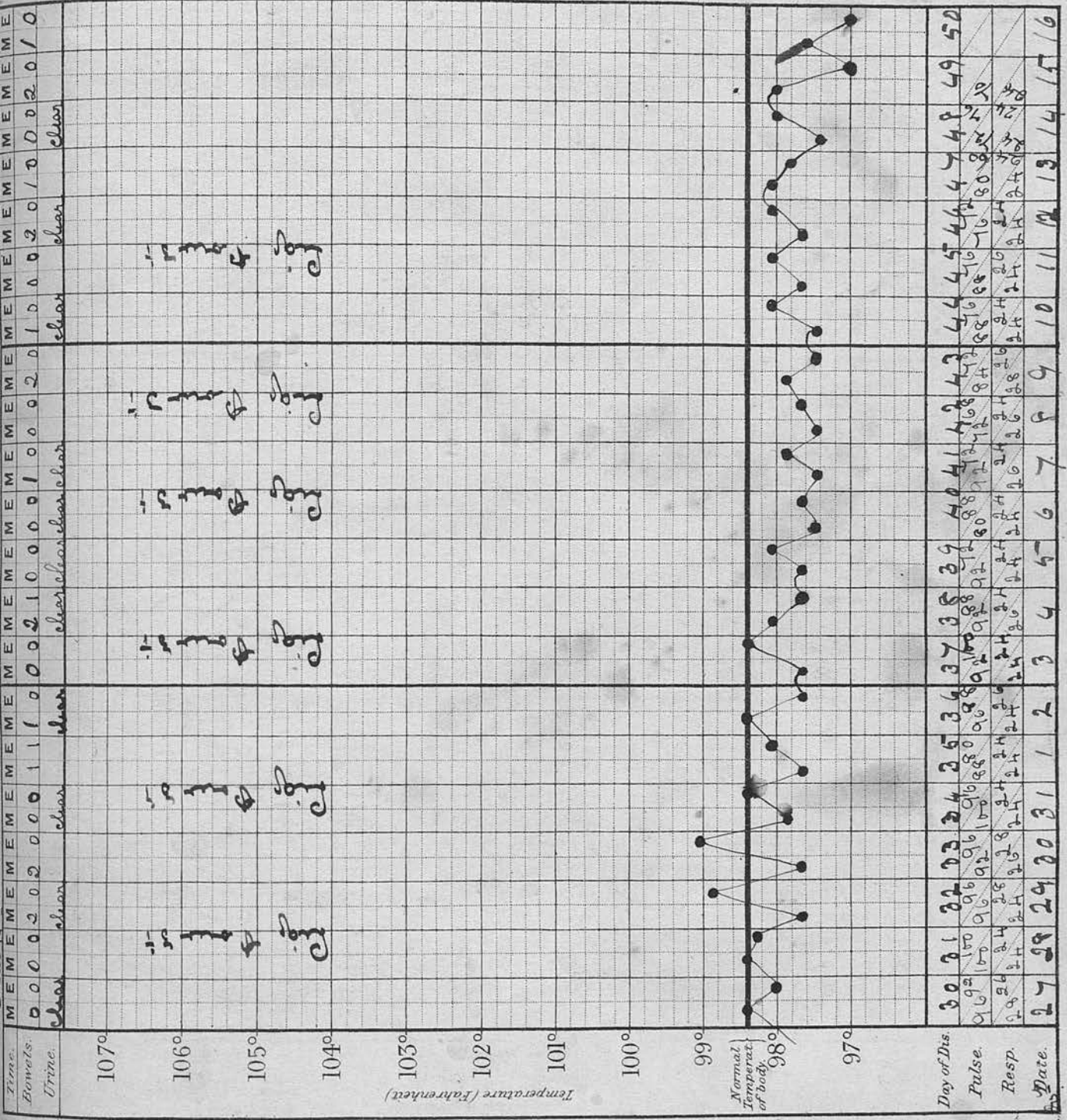
DISEASE.

Scarlet fever

Notes of Case.

Name { Sarah A. Flower  
Age 7 yrs  
Diet

Case Book No.



Date of admission.  
6 - 1 - 05

Result Discharged April 16



M	E
L	I
M	A
L	T
L	R
L	S
L	N
L	O
L	P
L	Q
L	R
L	S
L	T
L	U
L	V
L	W
L	X
L	Y
L	Z

[illegible]

A blank sheet of graph paper with a grid pattern. The grid consists of small squares formed by thin black lines. There are no margins or other markings on the page.

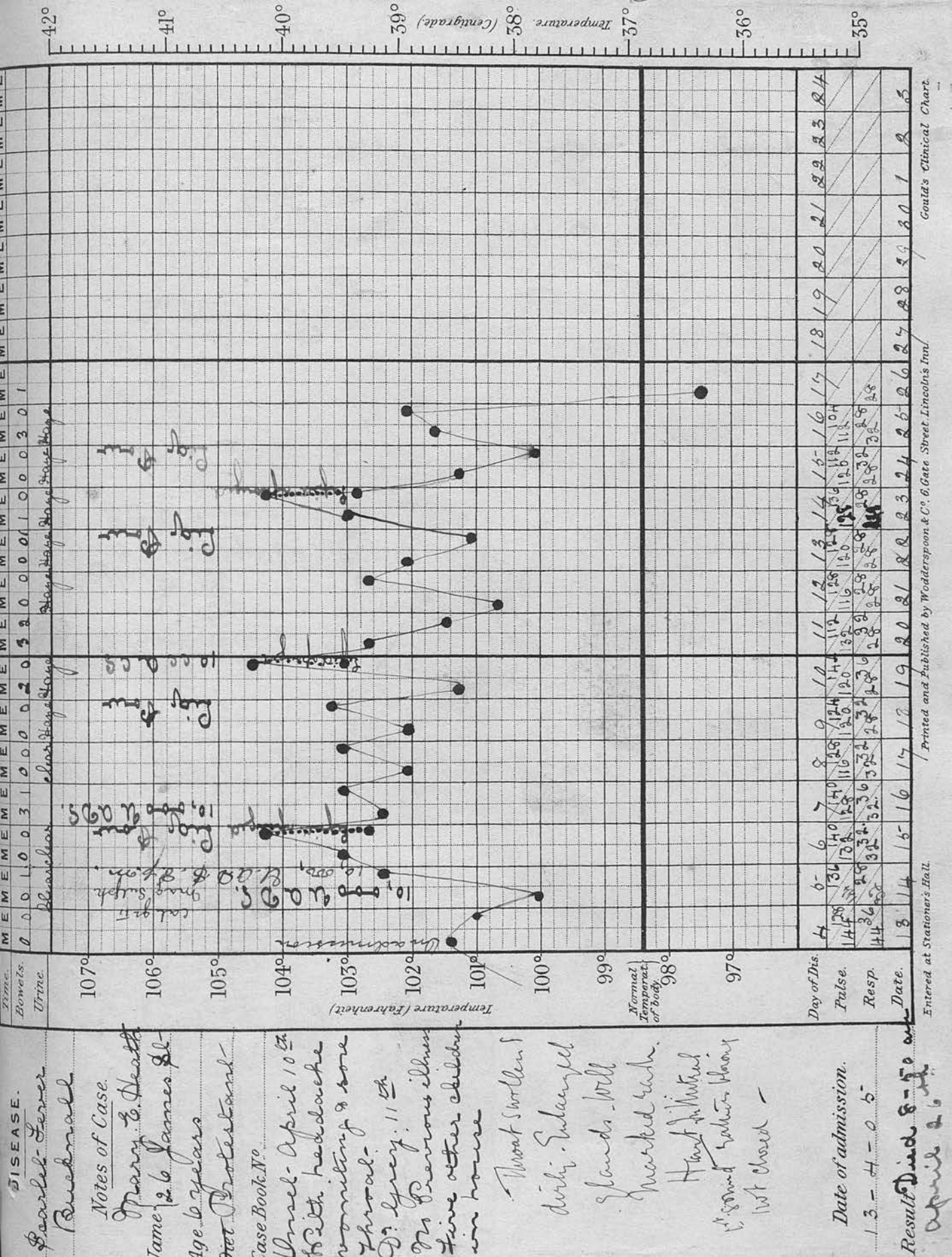
A full-page view of a blank sheet of white graph paper. The grid consists of thin, light gray horizontal and vertical lines intersecting at regular intervals to form small squares across the entire page. There are no margins, text, or other markings on the paper.

This image shows a full page of graph paper. It features a uniform grid of small squares formed by thin black lines. A single, thicker vertical line runs down the center of the page, dividing it into two equal halves. The paper is otherwise blank, with no text or markings other than the grid itself.

10

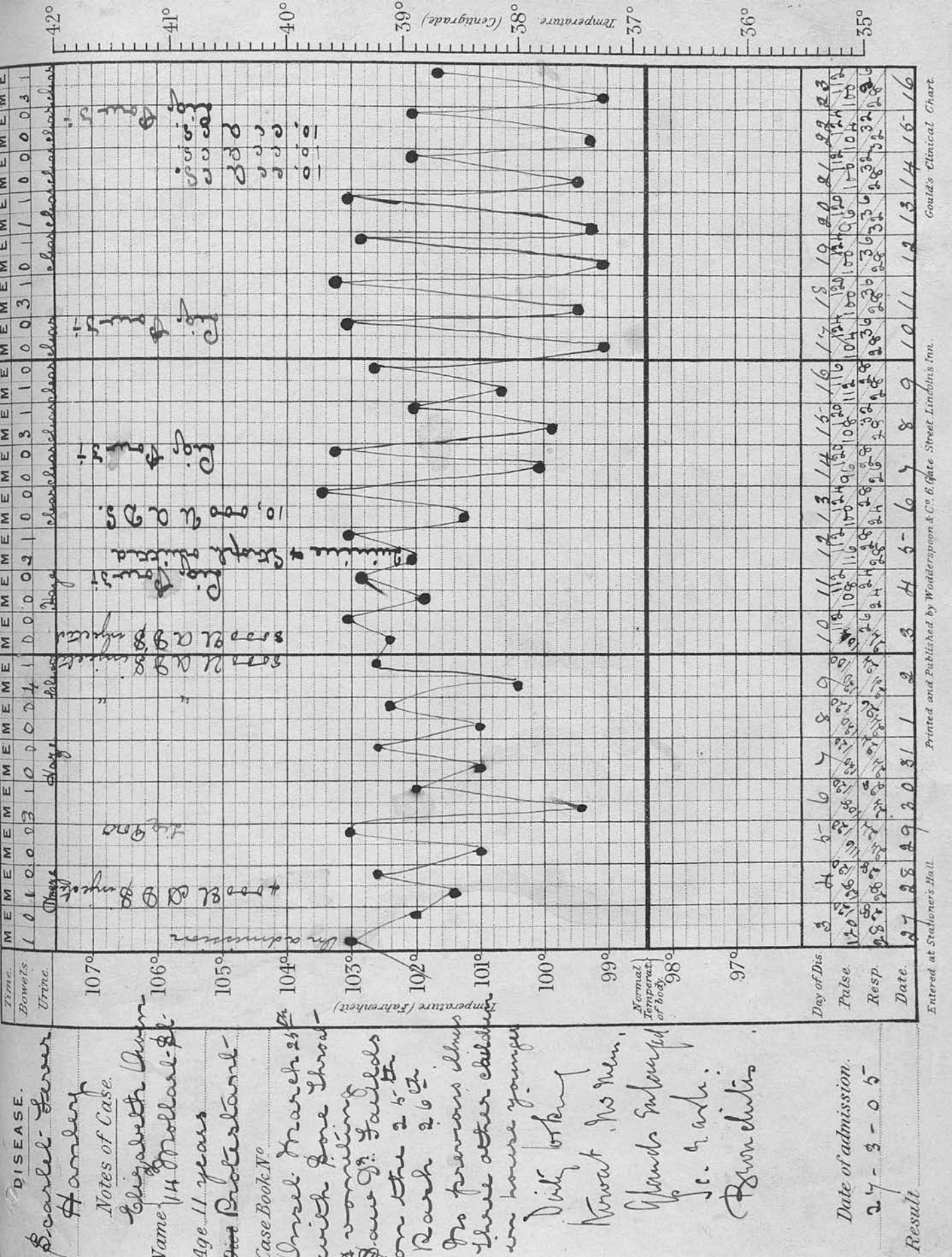
24 28 29 30 1 2 3

*Gould's Clinical Chart.*



三

## Result





DISEASE.

Scarlet Fever

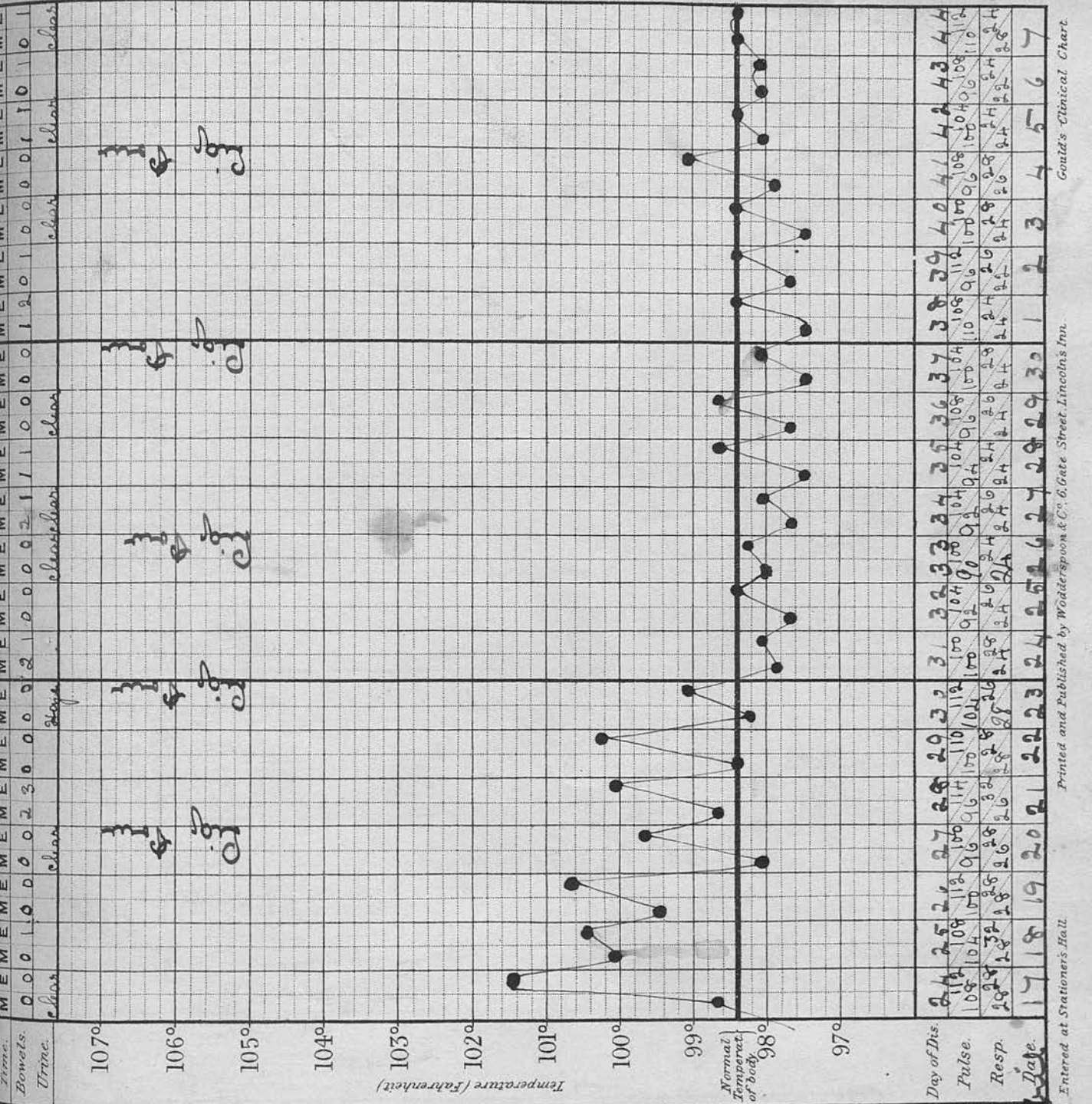
Notes of Case

Elphabeth

Age 11 yrs

Diet

Case Book No.



Date of admission.

27-3-05

Result Discharged

May 20 1885

Entered at Stationer's Hall.

Printed and Published by Widderspoon & Co. 6, Gate Street, Lincoln's Inn.

Gould's Clinical Chart



Notes of Case.

Cyril Redfern

Name 14 Allent Rd. Fallow

Age 2 yrs. 9 mths

Diet Potatoes

Case Book No.

Could hear ill for

about a month.

Diagnosing

Cont. by Dr. Young

Throat slightly  
red - no glands

Unchanged.

Peeling - nose

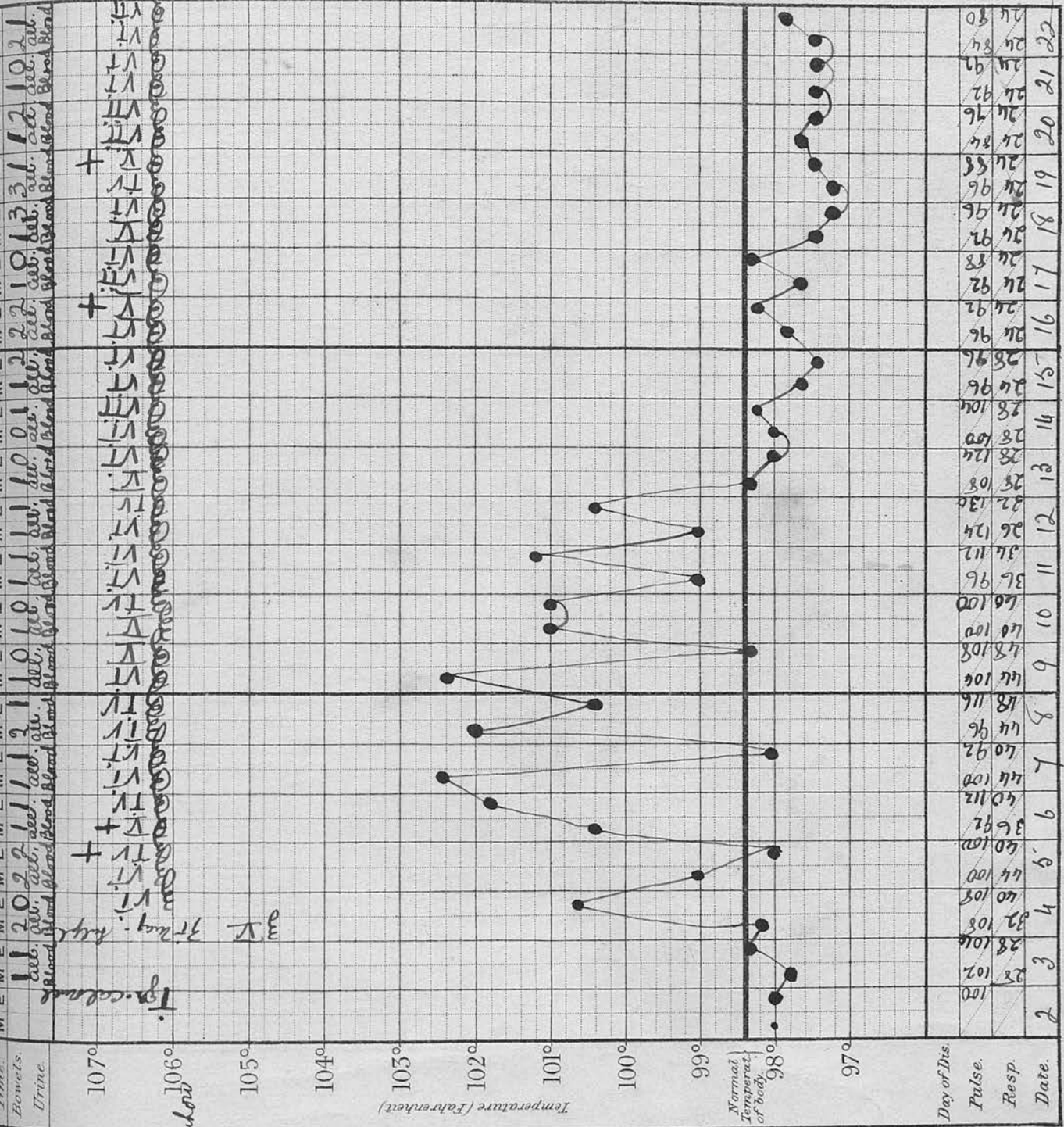
Eyes discharging

Face very puffy  
looking.

Date of admission.

2<sup>nd</sup> March 05

Result Well.



MEM	MEM	MEM	MEM	MEM	MEM	MEM	MEM
0000	0001	1011	1010	1011	1010	1011	1010

Cayul Redfern

Case Book No.

## Result

*Gould's Clinical Chart.*



# DISEASE.

Scarlet Fever

## Notes of Case.

Name Frederick Wright  
 Age 6 yrs.  
 Diet

## Case Book No.

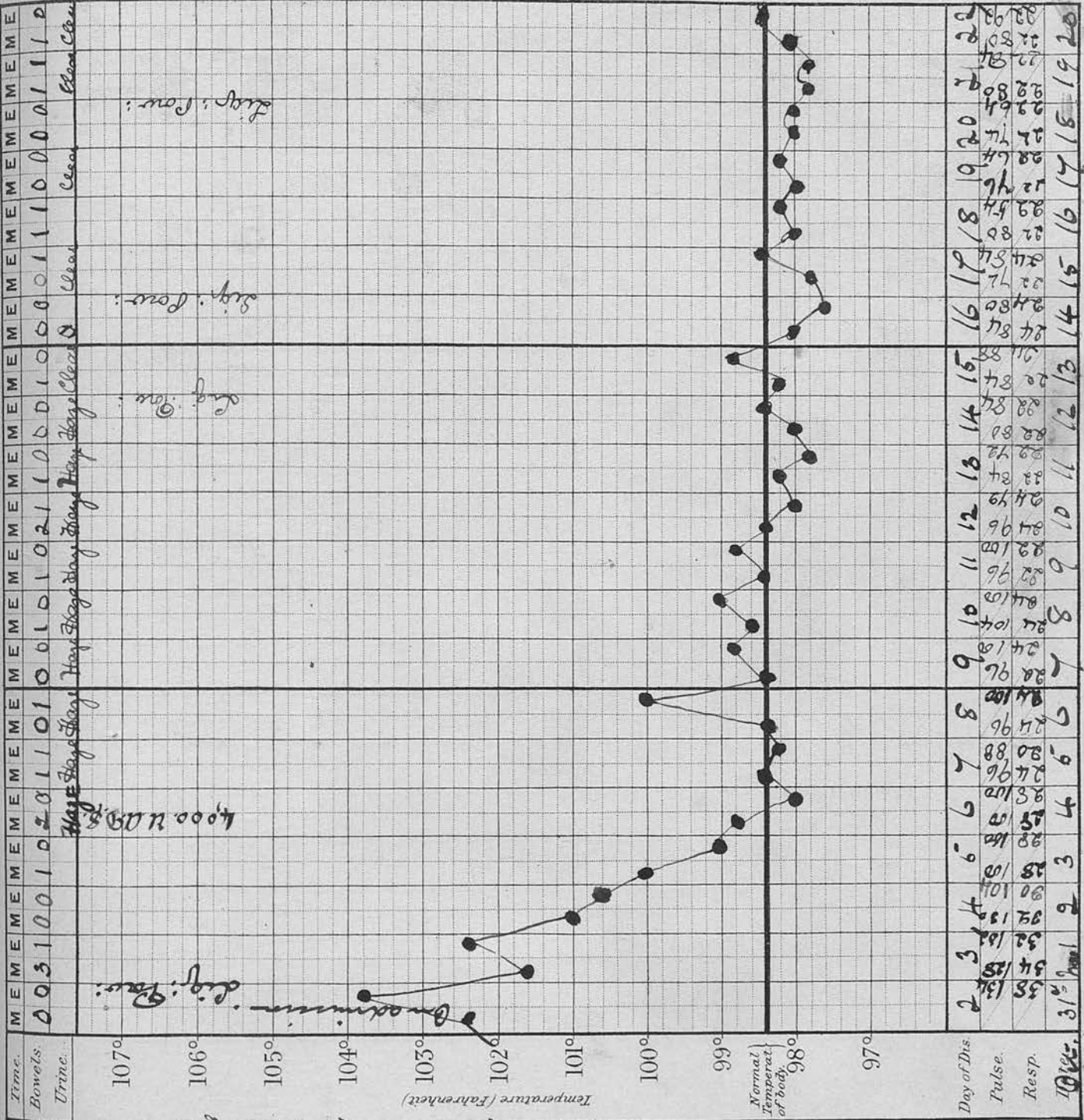
Admitted: Oct 29<sup>th</sup>. Admitted  
 to L. C. H. with  
 R. pneumonia. 50<sup>th</sup>  
 morning Temp: 105<sup>4</sup>  
 1<sup>st</sup> R. ad.  
 1<sup>st</sup> Cert: by Dr. Davis.  
 had a fit Oct: 28<sup>th</sup>.

ask all over.  
 large purpur &  
 swollen.  
 throat w.  
 gum about 3" long  
 l. pneumonia.

Date of admission.

Oct: 31<sup>st</sup> / 05.

Result Discharged





# DISEASE.

Scarlet Fever  
1 Heatstroke St

Notes of Case.

Willie

Name { Brown

Age 6 yrs

Diet

Case Book of Penry Legian

met Get 2.2 mid

headaches nose

throat.

on 24th

25th 26th

27th 28th 29th

30th 31st

1st 2nd 3rd 4th 5th 6th 7th 8th 9th 10th 11th 12th 13th 14th 15th 16th 17th 18th 19th 20th 21st 22nd 23rd 24th 25th 26th 27th 28th 29th 30th 31st

1st 2nd 3rd 4th 5th 6th 7th 8th 9th 10th 11th 12th 13th 14th 15th 16th 17th 18th 19th 20th 21st 22nd 23rd 24th 25th 26th 27th 28th 29th 30th 31st

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1st 2nd 3rd 4th 5th 6th 7th 8th 9th 10th 11th 12th 13th 14th 15th 16th 17th 18th 19th 20th 21st 22nd 23rd 24th 25th 26th 27th 28th 29th 30th 31st

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1st 2nd 3rd 4th 5th 6th 7th 8th 9th 10th 11th 12th 13th 14th 15th 16th 17th 18th 19th 20th 21st 22nd 23rd 24th 25th 26th 27th 28th 29th 30th 31st

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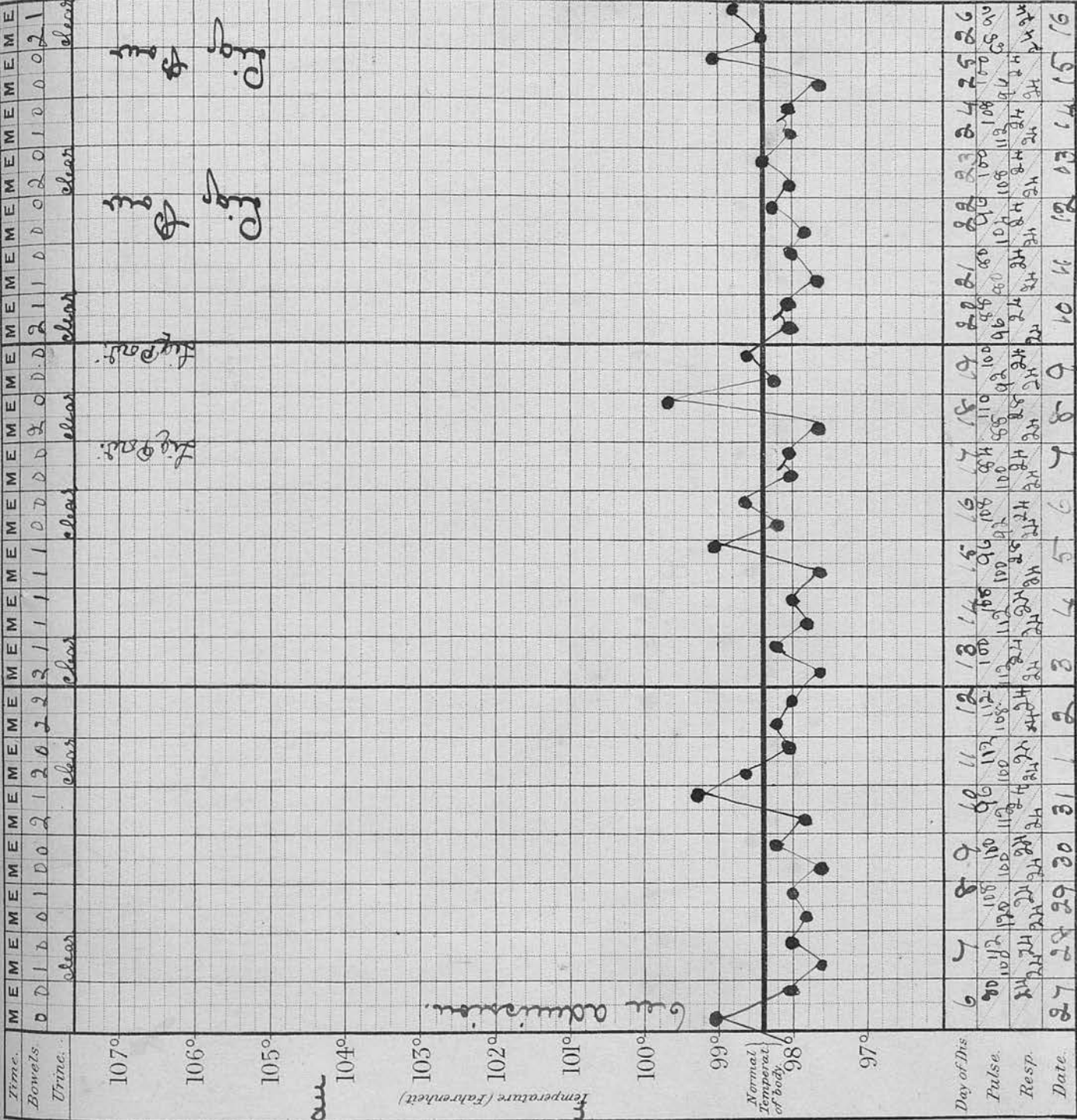
1st 2nd 3rd 4th 5th 6th 7th 8th 9th 10th 11th 12th 13th 14th 15th 16th 17th 18th 19th 20th 21st 22nd 23rd 24th 25th 26th 27th 28th 29th 30th 31st

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1st 2nd 3rd 4th 5th 6th 7th 8th 9th 10th 11th 12th 13th 14th 15th 16th 17th 18th 19th 20th 21st 22nd 23rd 24th 25th 26th 27th 28th 29th 30th 31st



Entered at Stationers Hall. Printed and Published by Widderspoon & Co. 6 Gate Street Lincoln Inn. Gould's Clinical Chart.

# DISEASE.

Scarlet Fever

## Notes of Case.

Name Willie

Age 6 yrs

Diet

Case Book No

Date of admission.

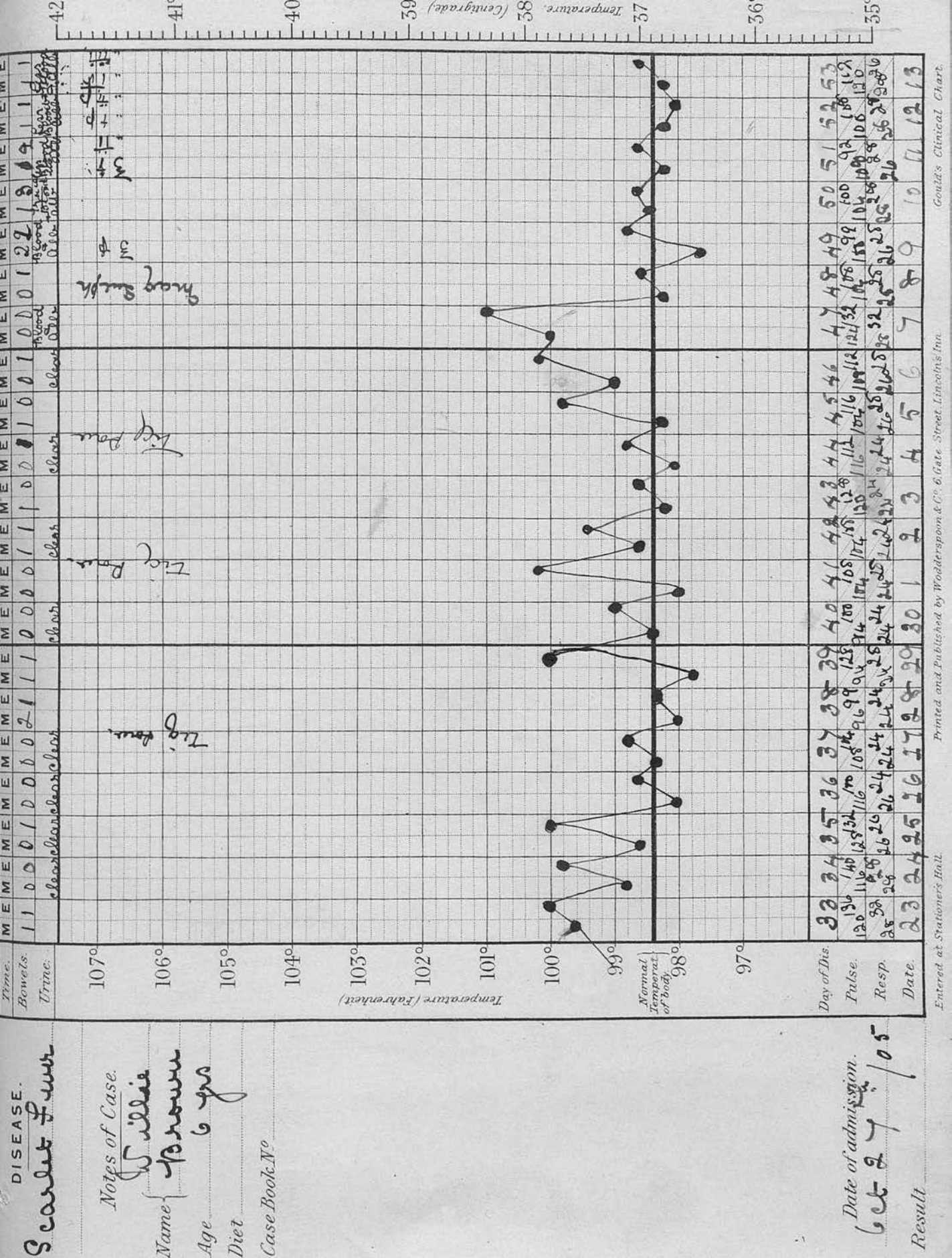
Oct 27 / 05

Result

Entered at Stationer's Hall.

Printed and Published by Widderspoon & Co. 6, Gate Street, Lincoln's Inn.

Gould's Clinical Chart.



Scout for

*Notes of Case.*

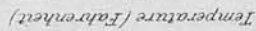
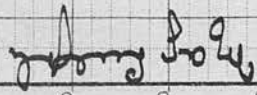
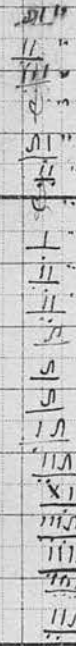
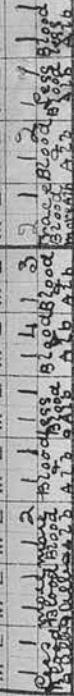
فصلد کی

Name \_\_\_\_\_

Age

Diet

Case Book No.



*Date of admission.*

6627/05-

Dead 9: pm. 24.4.

*Entered at Stationers' Hall.*

Printed and Published by Wolderspoon & Co. 6 Gate Street, Lincoln Inn.

*Gould's Clinical Chart.*



Scarlet Fever

some address 75 Reuther  
unemployment 1000s of case.

Name { of course  
Shelly

୧୫୫



Case Book No.

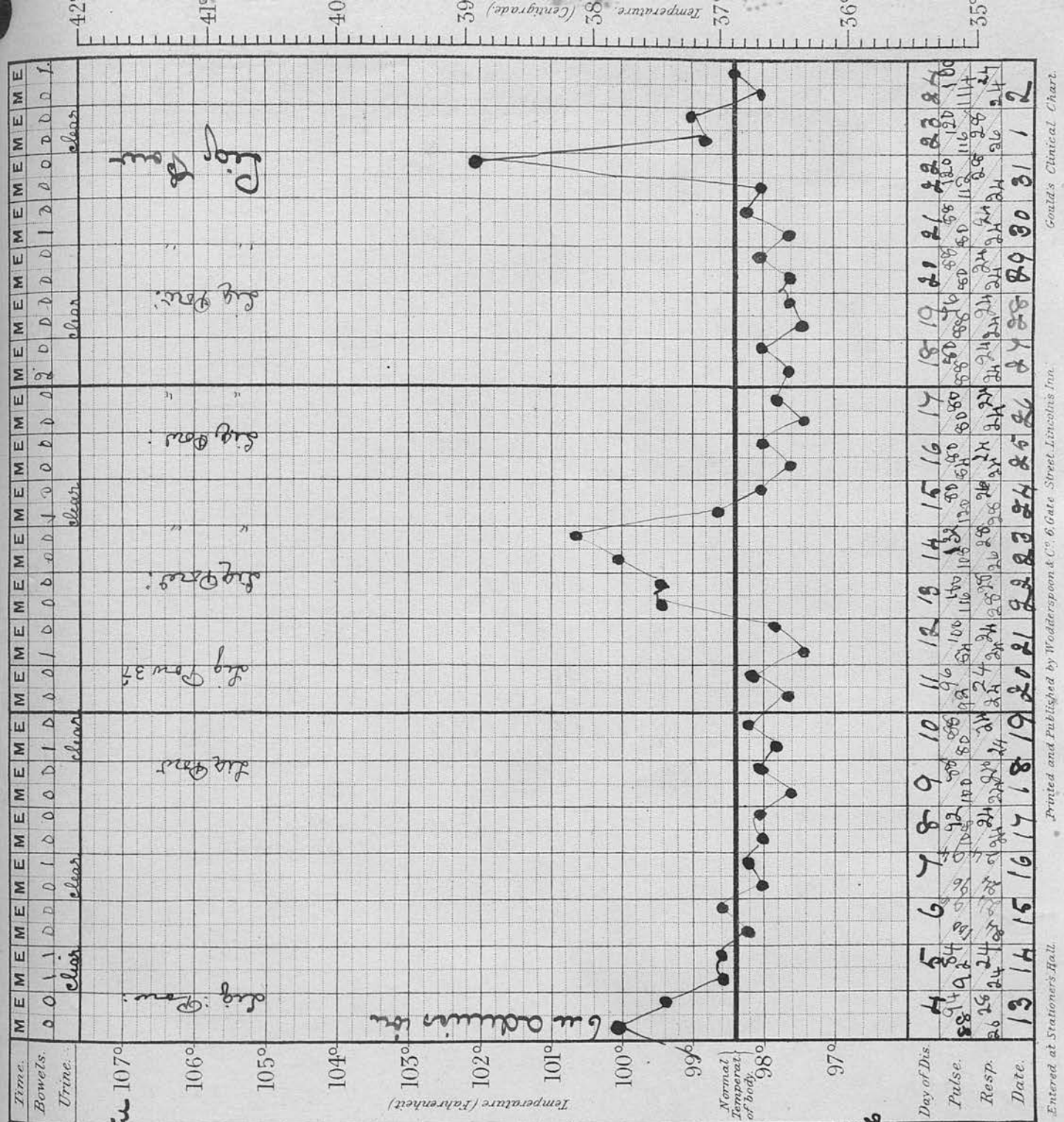
Admitted at 989  
Oct 5<sup>th</sup> with  
artificial  
operation Oct 7<sup>th</sup>  
Oct 10<sup>th</sup> Park,  
no vomiting or  
more throat  
Certified by  
Dr. Gunning, Oct  
11<sup>th</sup> June 10<sup>th</sup> 1881  
Oct 12<sup>th</sup> 1861

Rash all over.  
Lymph Clean also  
throat. Wound Septic  
infection dressing, put  
lying through. Put  
Nitride.

*Date of admission.*

Oct 13 / 06  
Date of admission.

## Result



DISEASE.  
Scarlet Fever  
Melville St Stokes

Notes of Case.

Name { **Malind**

Age { **5 yrs**

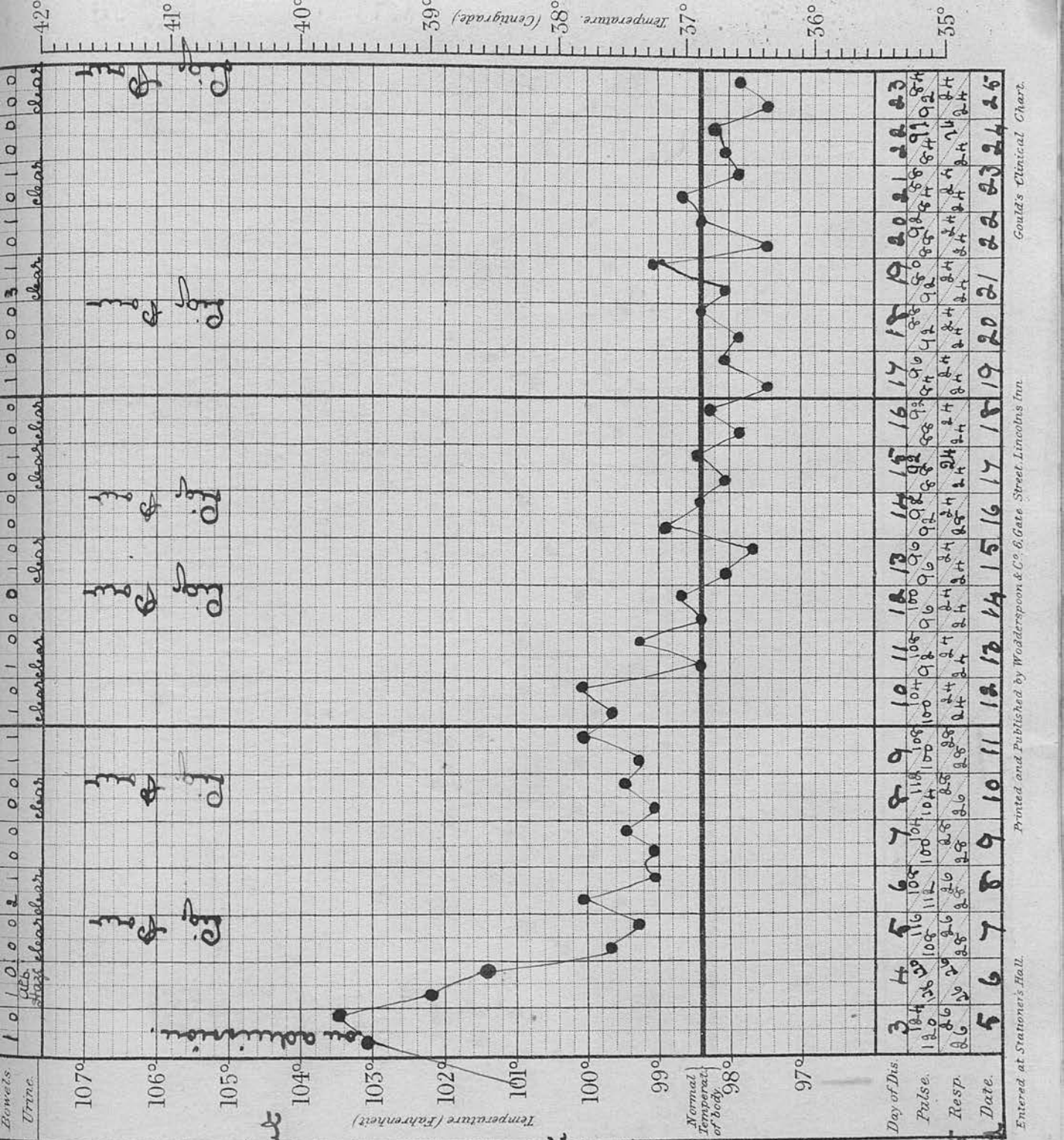
Diet { **in ill**

Case Book { **Protentant**

met Aug 3rd  
with sore throat  
and vomiting  
rash to  
Southwell &  
earliest  
cough  
indicated 4 and  
supplied  
well marked rash

All over.  
Tongue very much  
furred - white.  
Patch R. tonsil.  
8th Aug. Still small  
patch. Bact. Exam.  
Negative.

Date of admission **Aug 5th 1905**  
Result **Discharged**  
**Oct 3rd**



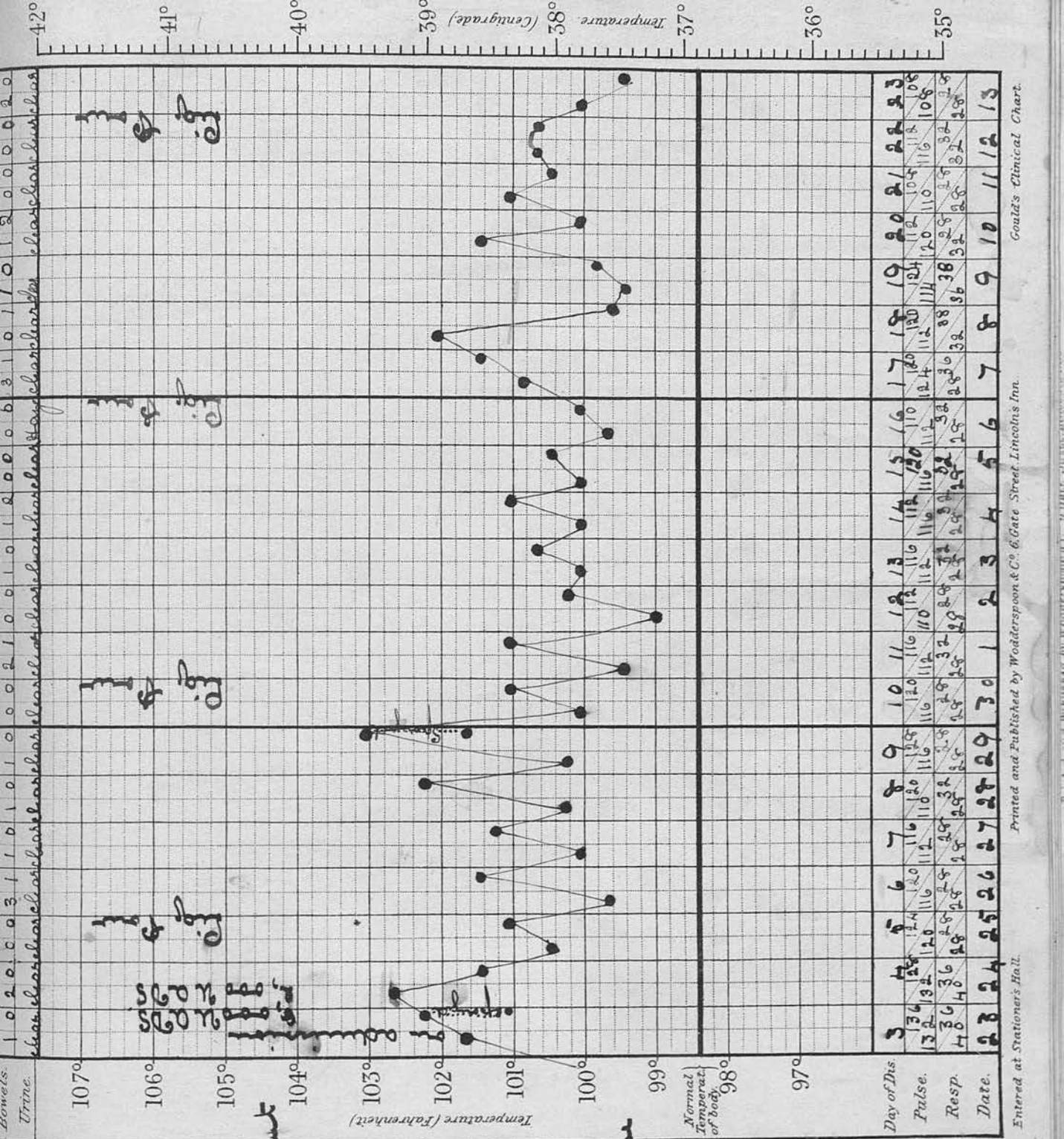


Scarlet Fever  
42 Talbair St  
Notes on Case

Name { Mary  
Age 9 yrs  
Diet

Casa Real Protestant  
admitted June 21  
with severe  
sore throat & vomiting  
June 21, 11  
D.D.P. under treatment  
P.O. in ear for  
2 yrs. Last  
official trouble  
1 1/2 yrs ago, 6 months  
elaborate in house

Date of admission.  
June 23 " 11  
Result





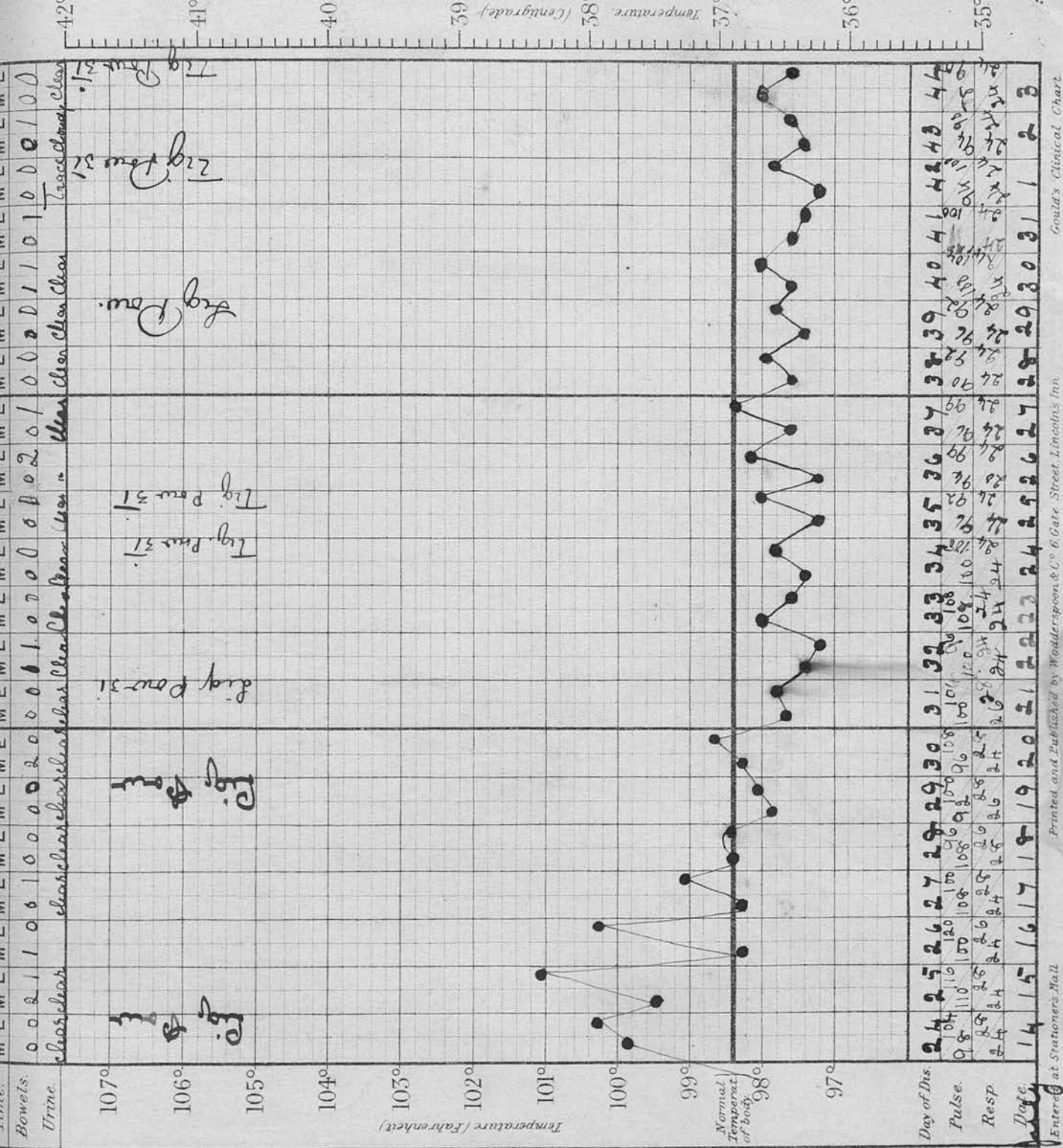
Scarlet Fever

Notes of Case.

Name	John J. Smith.
Age	21 yrs
Diet	

Age

Case Book No.



*Date of admission.*

June 23<sup>rd</sup> / 05

## Result

DISEASE.

Scarlet Fever  
20 June St

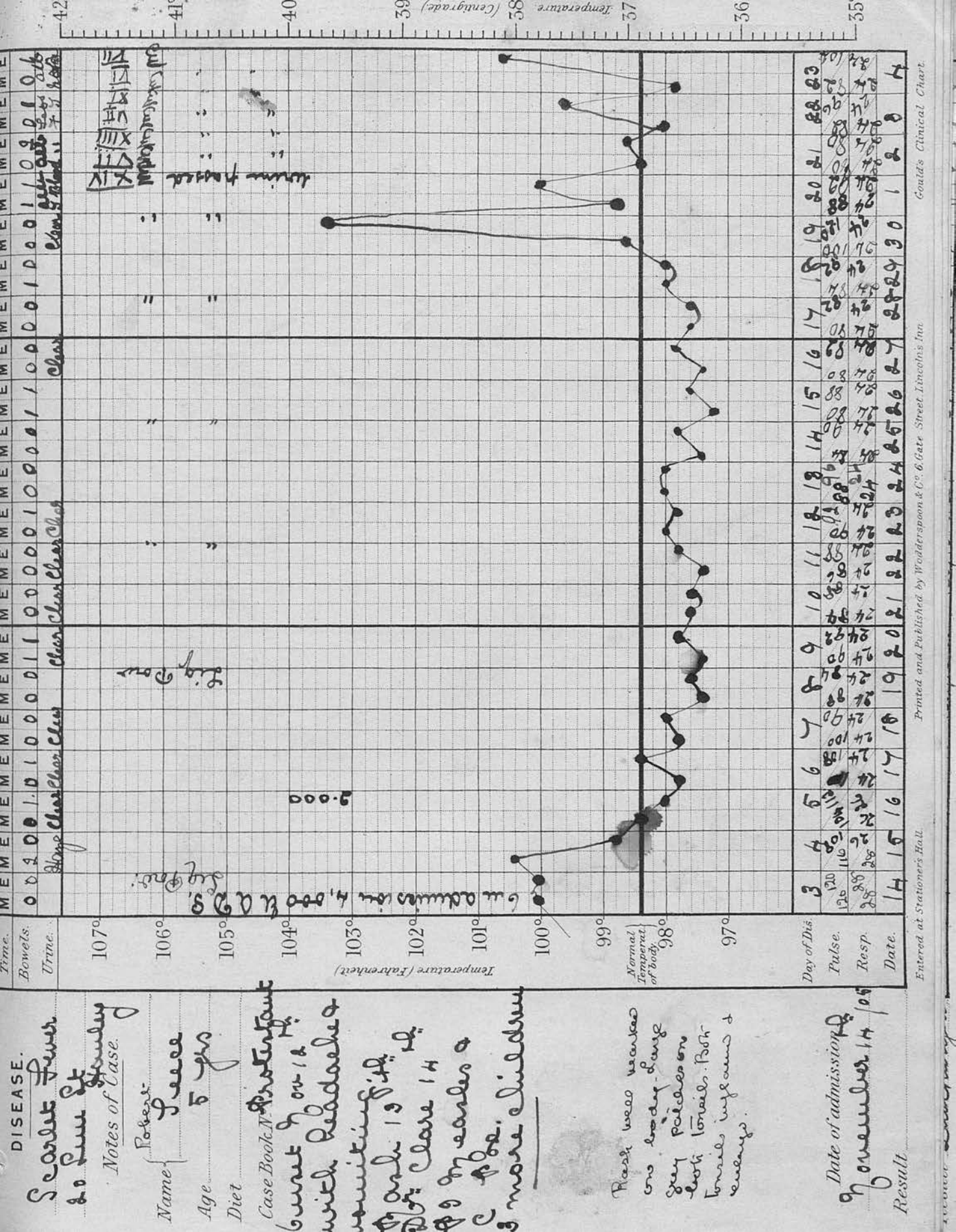
Notes of Case.

Name { Robert  
Age 5 yrs  
Diet

Case Book N. Protestant  
burst 7 or 12 H.  
with Reddish  
vomiting 14  
Dark 13 14  
Clear 14  
99 years  
C 14  
more children

Rash well marked  
on body - large  
grey patches on  
loft loins. Pot-  
terile ingland &  
enlarged.

Date of admission 14/06  
Result



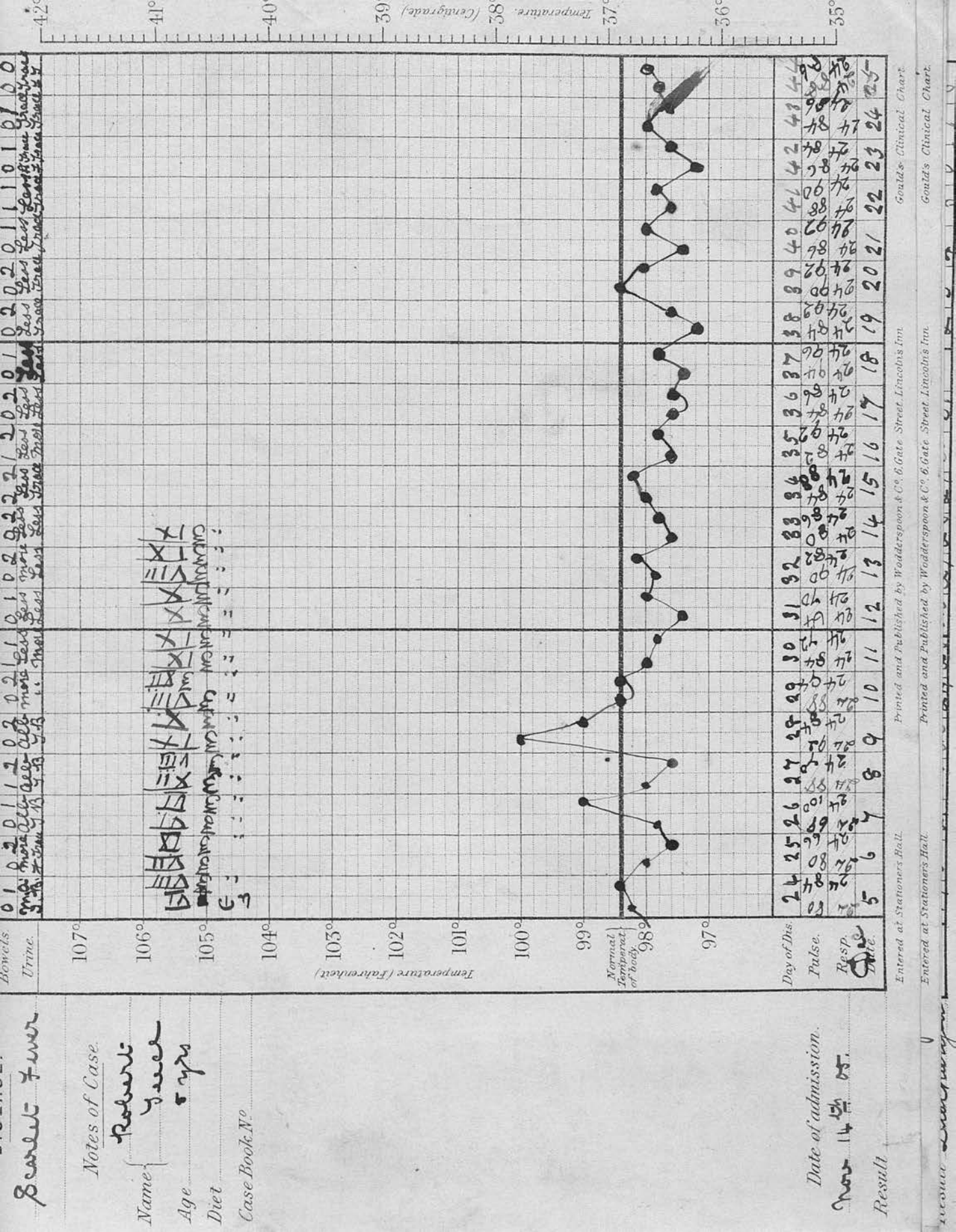


Scarlet Fever

Notes of Case.

Name { Robert  
 Age 5 yrs  
 Diet

Case Book No.





# DISEASE.

Scarlet Fever  
24 W. College Street  
Notes of Case

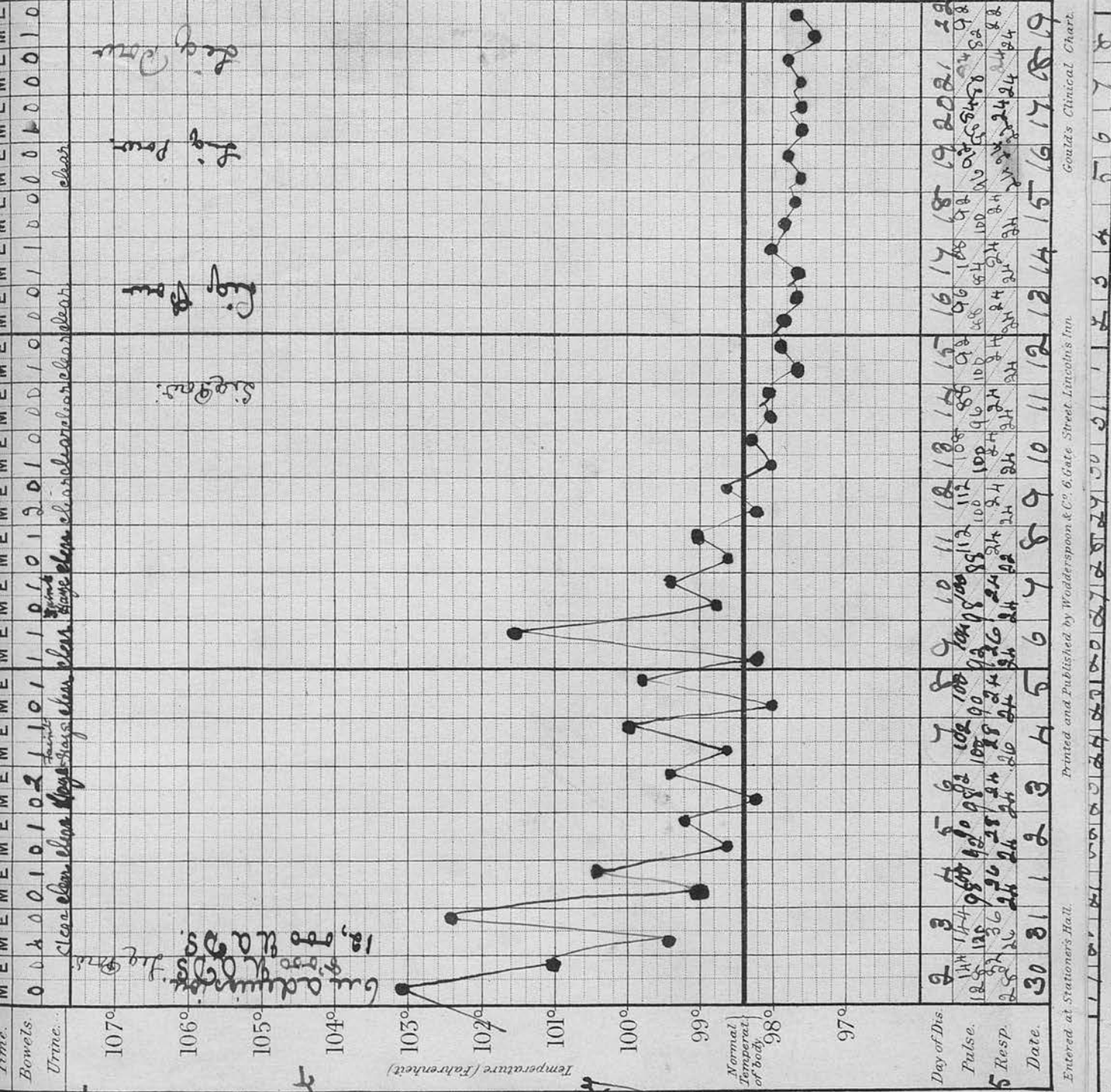
Name { Hilda  
Pickin  
Age 9 yrs  
Diet

Case Book No. 1707  
Onset Oct 24  
Headache, nose  
throat & vomiting  
only 29  
Faulds 30  
Faulds 4  
Cough in infancy  
to 6 & 7  
older  
children.

Free malarial rash.  
Suspicious patch  
L. breast.  
Lymphatic.  
B.S. Positive.

Date of admission, 24  
October 30 / 05  
Result Discharged.

Result Discharged.



قائمة المصادر.

فان

Age 40 1/2 - Shedden

Case Book No.

ॐ नमो भगवते वासुदेवाय

throughout is

62923

151

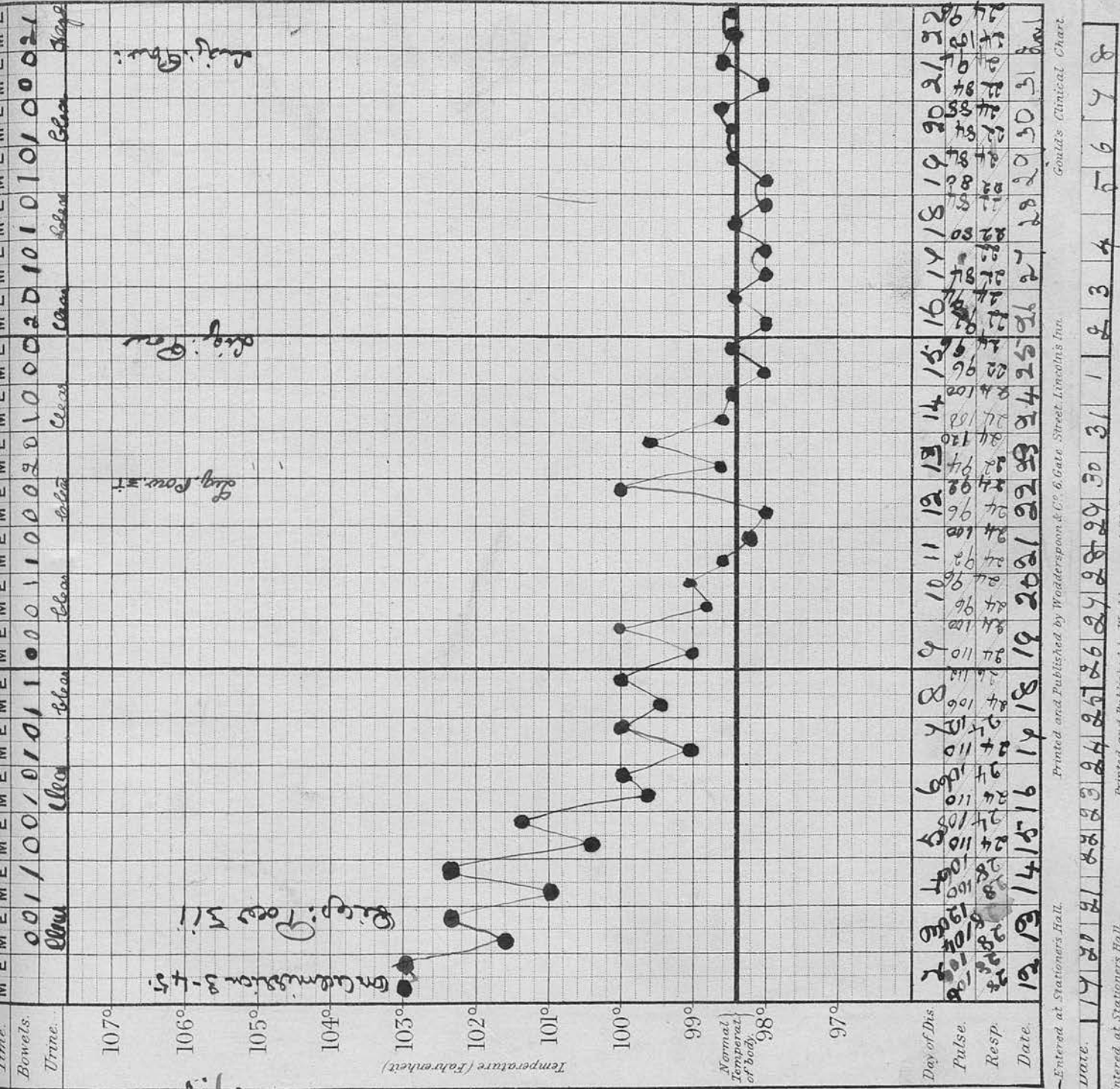
l'ingue v. pures.

Ambo. sk. 10.

189

15-12-a

Result Discharged



6	9	7	6
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8	0	3	1	7	2	8	6	9
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Printed and Published by Widderspoon & Co. 6 Gate Street, Lincoln's Inn.

9	7	9	6	7	2	6	9	9	0	0	2	1	0
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2	1	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
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Gould's Clinical Chart

100

[illegible]

678







*Leptotheca*  
*Leptura* Locks  
*Leptura* Locks  
*Leptura* Locks

Name { Mrs Olive Pritchard

Age 35 years

Diet Protestant

Case Book No. \_\_\_\_\_

were Oct. 18 = 1  
 ore Throat &  
 vomiting, Cest. by  
 2 Hills 19 =  
 Child in House  
 of none B.O. 18 =  
 20 A.D. 8.

Ten Admins  
 Large Patch or  
 P. Gonil, smaller  
 2 P. Cervical  
Plants enlarged  
 Transferred from  
 D. Lutheria Ward  
 Oct 20<sup>th</sup> with  
 Scarlet Ash.

~ Date of admission:

Oct. 19<sup>th</sup> - 1903

Result Discharged

[illegible]

84 Scarlet Fever  
Fallot, St.

James W

Age 10 ~~9~~ 1/2

*Case Book No. Protentah-*

Handwritten text: *Handwritten text, possibly a signature or name, written vertically.*

97

11.

Spilanthus

*Impatiens v. distyl.*

✓ lensil.

B. Ca. Negative.

9501/105

Result Discharged

[illegible]



Scarlet Fever.  
Hartley.

Name Harold Wood  
9 Beresford Street

Age 10 years.

~~Diet~~ Protestant.

Case Book No.

inset. now: 4<sup>th</sup> with  
overcoat & headsets,

vi. 8  $\frac{1}{2}$  Rash.

v: 8<sup>th</sup> Cent: by

W. Woodward.

D.J. Medales & Co. Pa.

Egg 220.

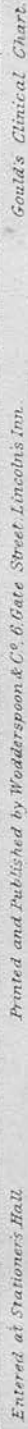
more child in  
the house.

Rash on body & upper limbs; throat red & swollen greyish looking on the right side. Was a scald on R leg just above the ankle, about 4 inches long.

*Date of admission.*

Page: 9. 11/05.

Result 6.4. Capital





Scarlet Fever  
& Diphtheria

Name { Stavrod Wod

Age 16 yrs

Diet

Case Book No.

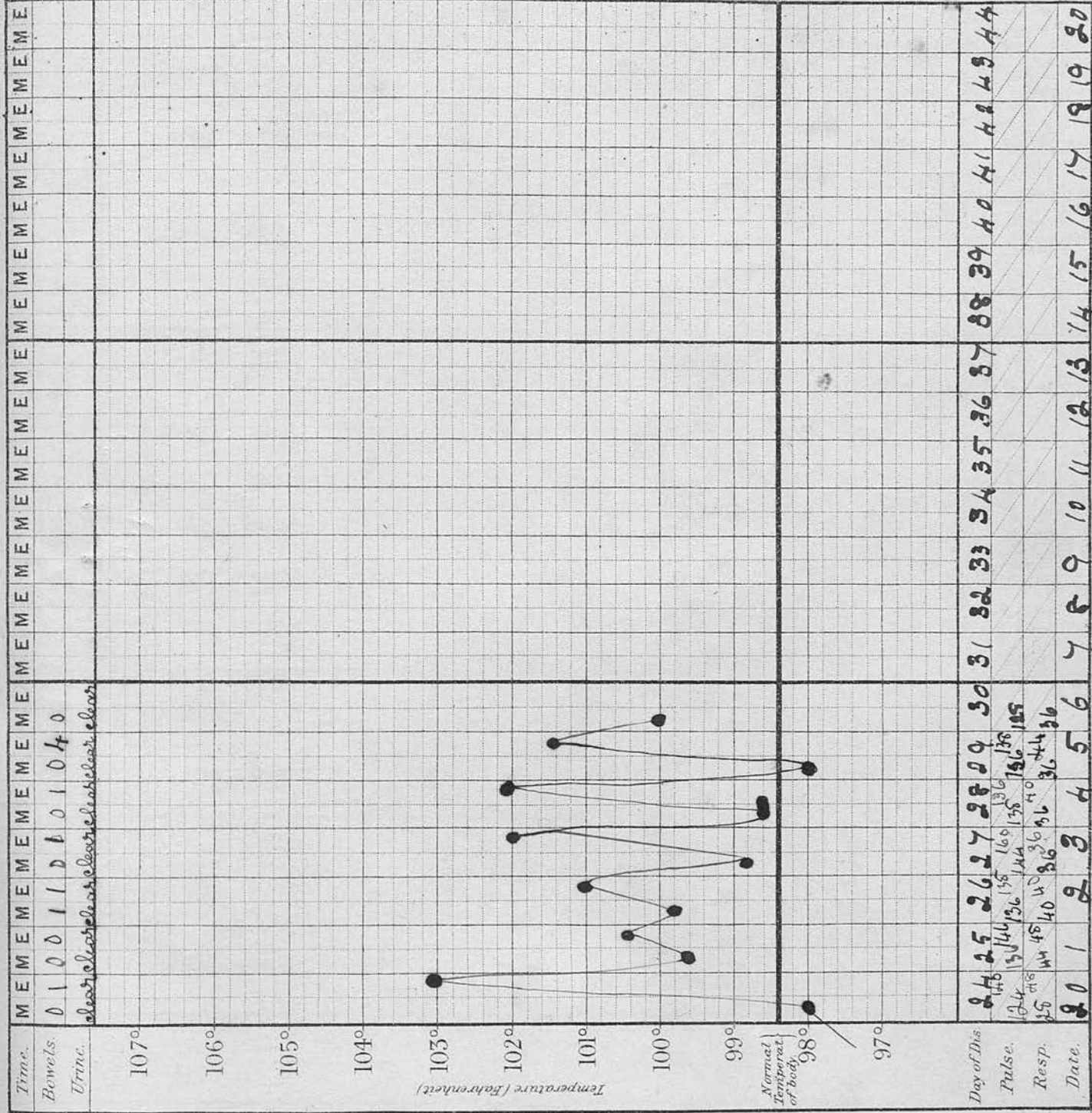
See also Supplement  
Tom phthoridis -  
Usp. - numerous.

Dec 6<sup>th</sup> Dec.

*Date of admission.*

Date of admission. 07 Nov 9 / 05

## Result



# DISEASE.

Scarlet Fever.

Hamley.

Notes of Case.

Name { Elsie Madaley  
13. Newlands St.

Age 11. Years

Diet Protestant.

Case Book No.

Onset: Nov. 14<sup>th</sup> with  
throat, vomiting  
headache.  
Nov. 16<sup>th</sup> Rash.  
Nov. 16<sup>th</sup> Cereb. hyper.  
Lillivets.  
P.P. Dresses in  
infancy  
+ have Philodend.  
house.

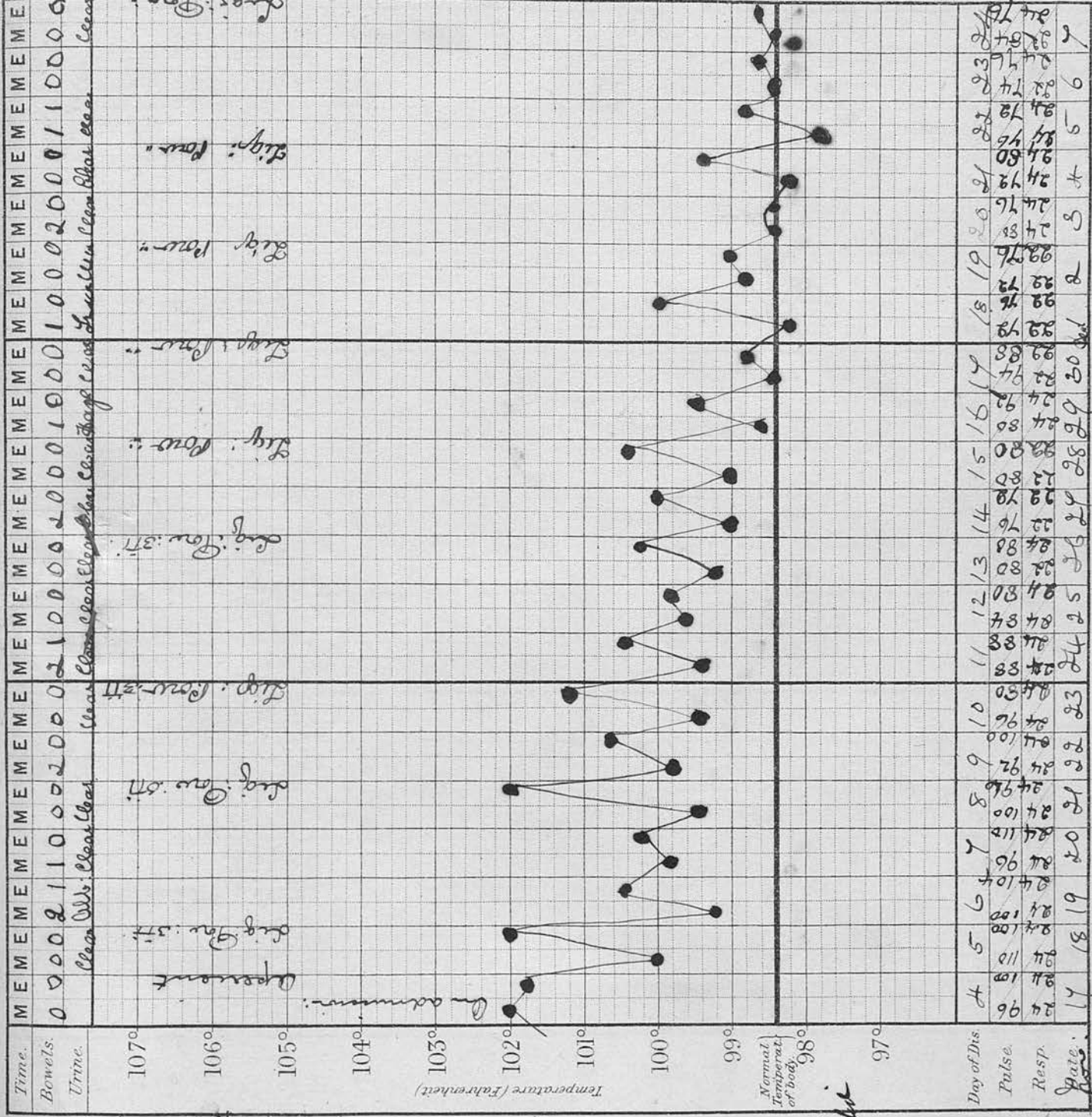
Good rash on  
admission but  
most clear but  
red swollen  
+ ant dry throat  
Cough when admitted

Date of admission.

17-11-05

Result Discharged

23-11-05.





# DISEASE.

Scarlet Fever

Hanley

Notes of Case.

Name R. Oradeley

Age 13

13 December 1884

Age 11 years

Diet

Case Book No.

Temperature (Fahrenheit)

Normal Temperature of body

Day of Dis  
Pulse  
Resp.  
Temp.

Date of admission.

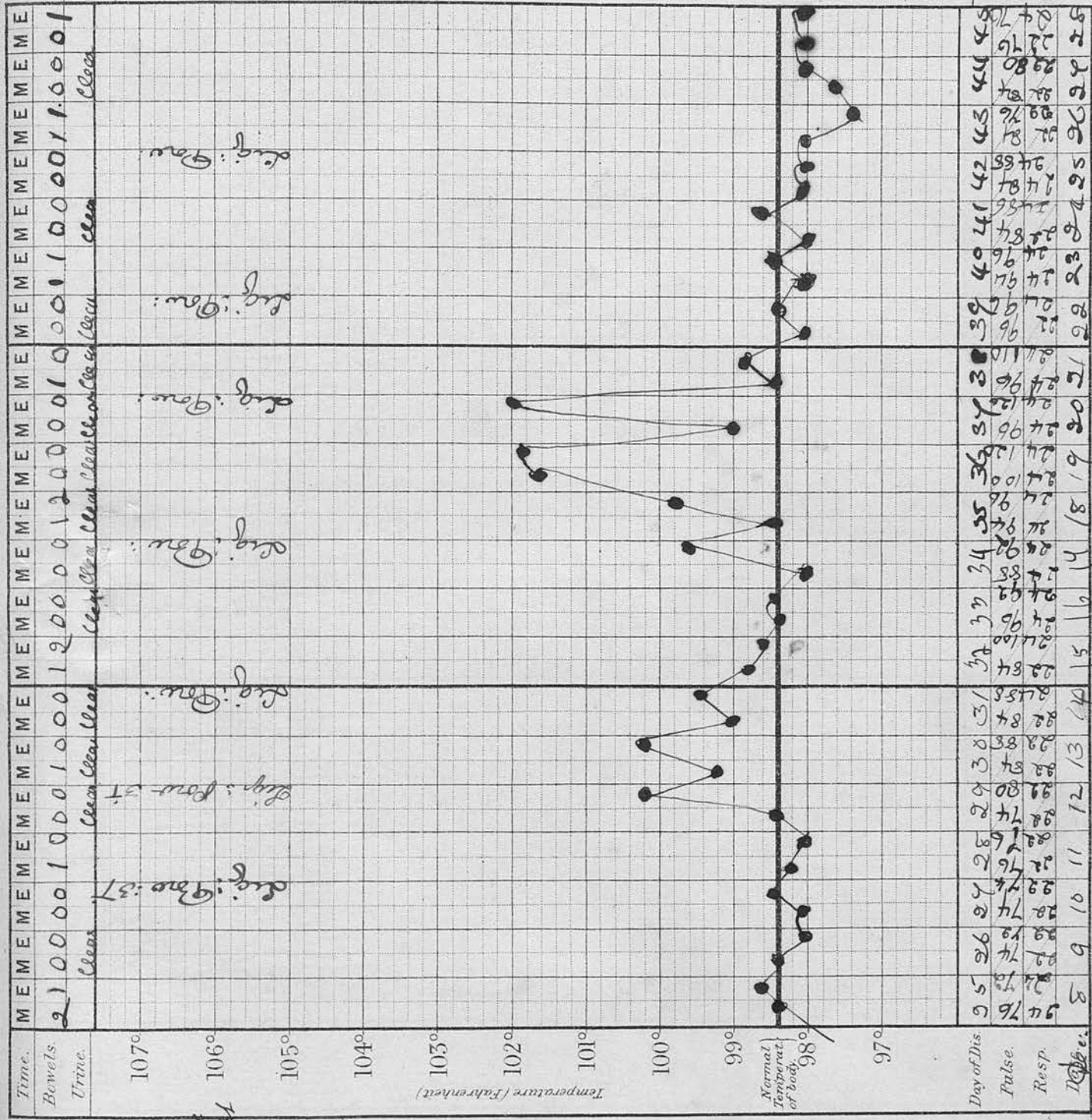
17-11-05

Result

Entered at Stationer's Hall.

Printed and Published by Weylspoon & Co. 6, Gate Street, Lincoln's Inn.

Gould's Clinical Chart.





# DISEASE.

Scarlet Fever

5 & Charles Street

Notes of C. Stanley.

Name { Reginald. Robert

Age 5. Years

Diet Protestant.

Case Book No.

neck, hoarse with

headache, sore throat,

vomiting

on 5<sup>th</sup> of March.

on 6<sup>th</sup> of the Pendergast

J. J. Treaster in infancy

subject to Conduction

2 more children

in house.

Well marked rash

on body & limbs

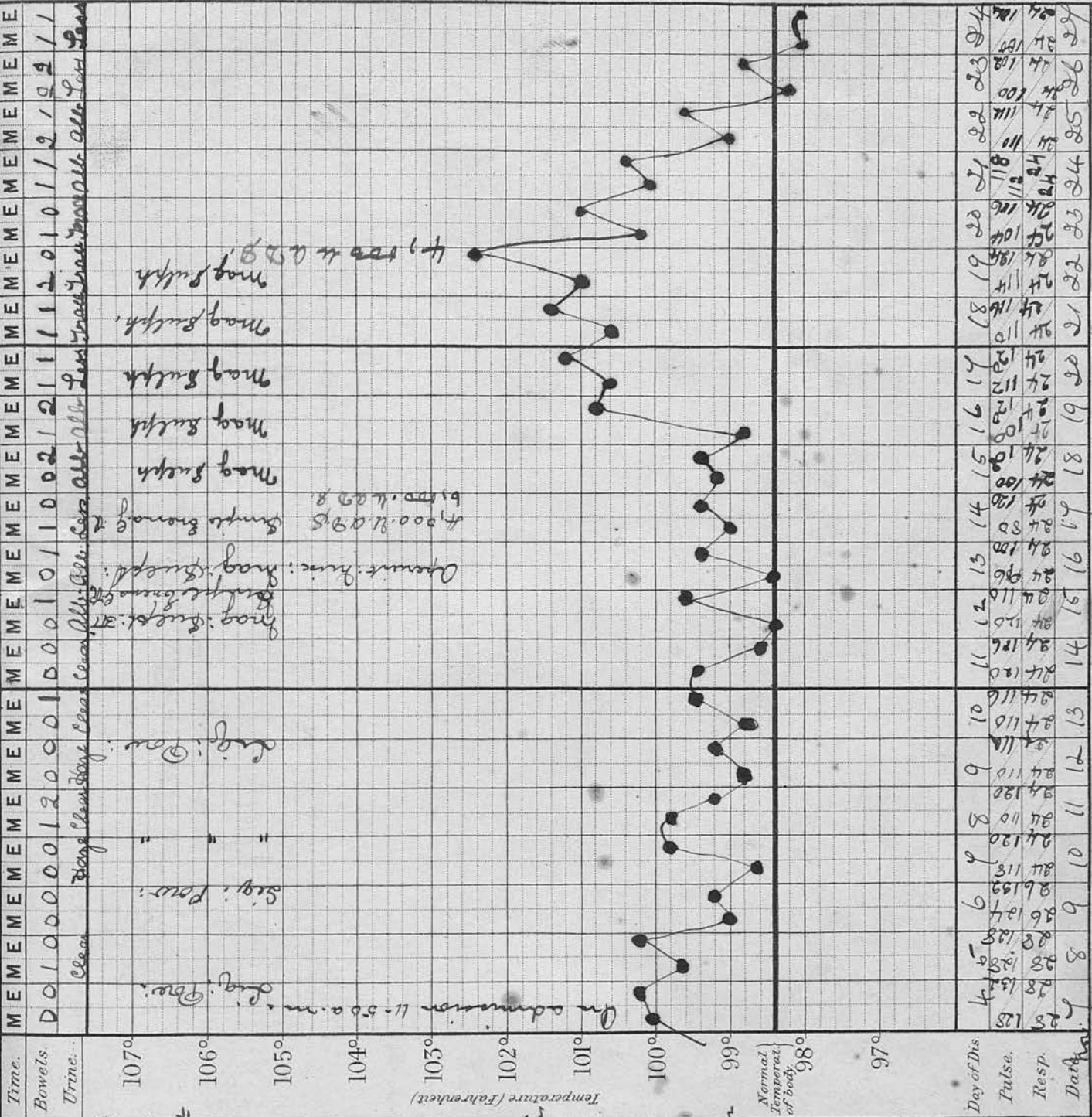
throat led to swollen

tongue & cured

Date of admission.

Nov. 4<sup>th</sup> / 05

Result



# DISEASE.

Scarlet Fever

Notes of Case.

Name { Reginald  
Yagg

Age

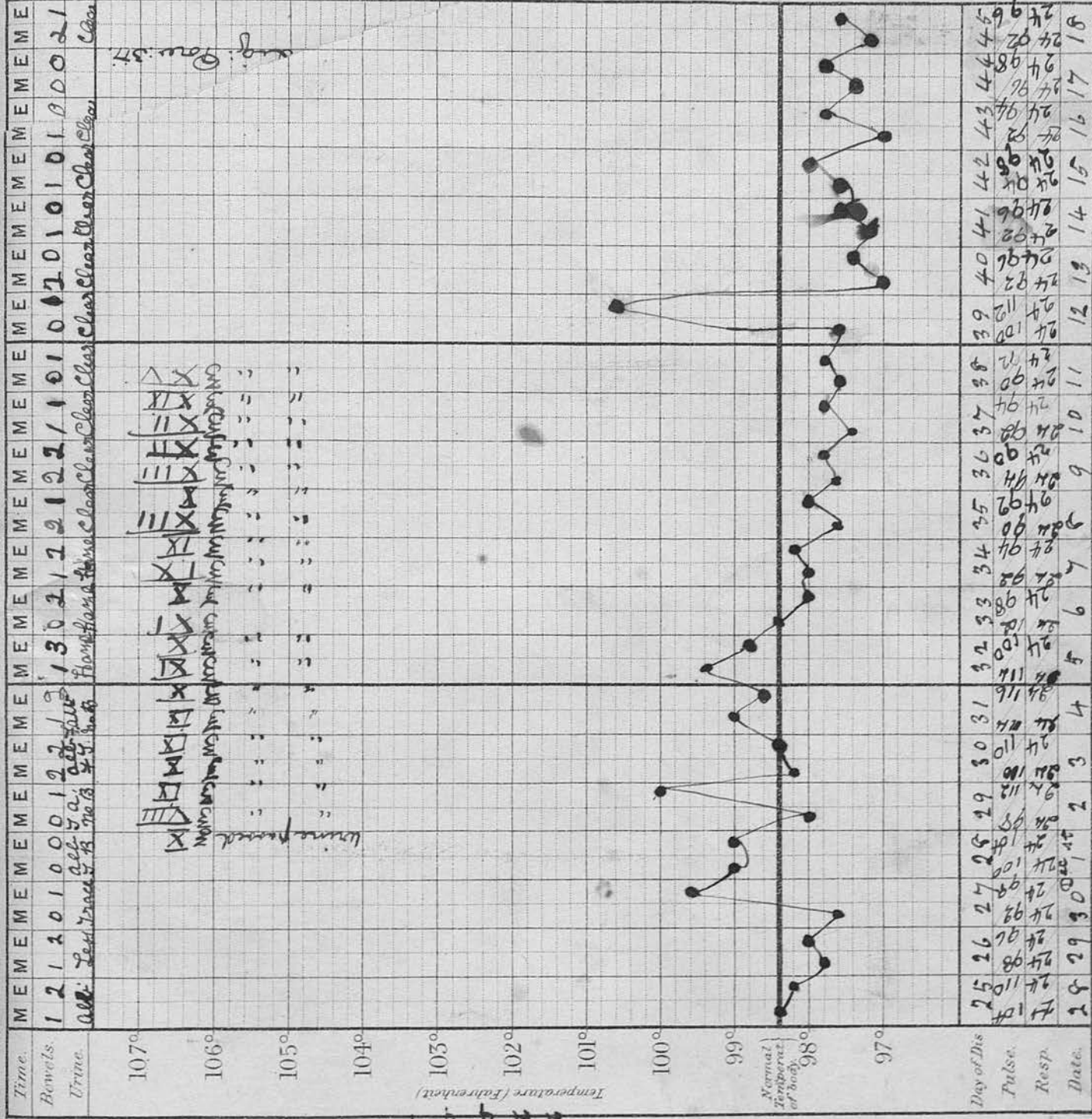
Diet

Case Book No.

Urine Clear 21.12.05  
" Clear 22.12.05  
" Clear 23.12.05  
" Clear 25.12.05  
" Clear 4-1-06  
" Clear 9-1-06

Date of admission.  
Nov 7th 05.

Result Discharged





# DISEASE.

Scarlet Fever

58 Charles St

Notes of Case.

Name George  
Lagg.

Age 7 years

Diet

Case Book No

Urine Clear 20-12-05

" " Clear 22-12-05

" " Clear 4-1-06

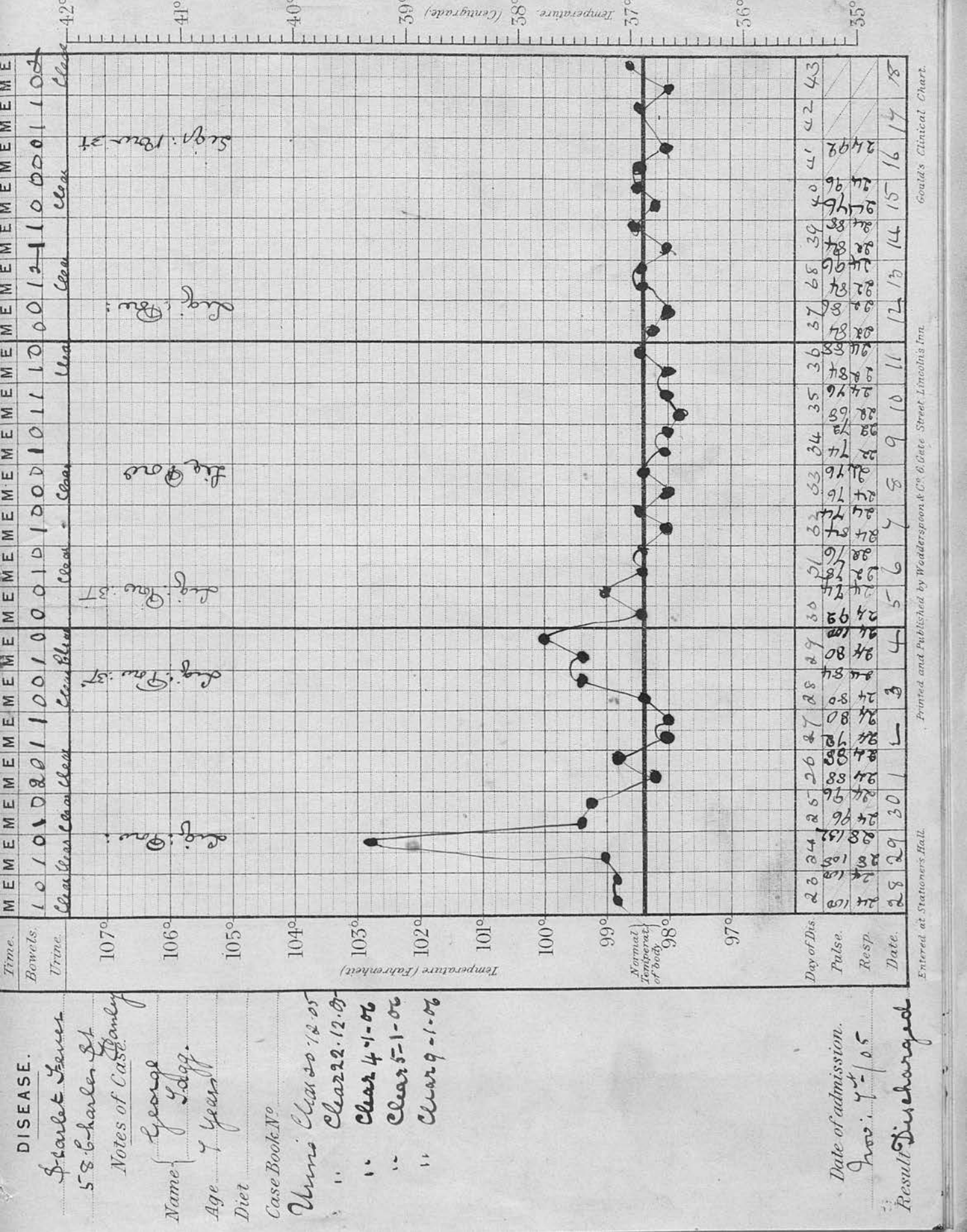
" " Clear 5-1-06

" " Clear 9-1-06

Date of admission.

Nov. 7-1-05

Result Discharged





## DISEASE.

Scarlet Fever  
44 Havelock St

Notes of History

Name William  
Wilson Parker

Age 14 yrs

Diet

Case-Book of Protistants

Onset August 20

Headache &amp; sore

throat. Rash 21st

D. &amp; R. July 21st

D. to convalescence

Myocarditis &amp; proso

to children

3 younger &amp; older

sparing each.

Lungs clear.

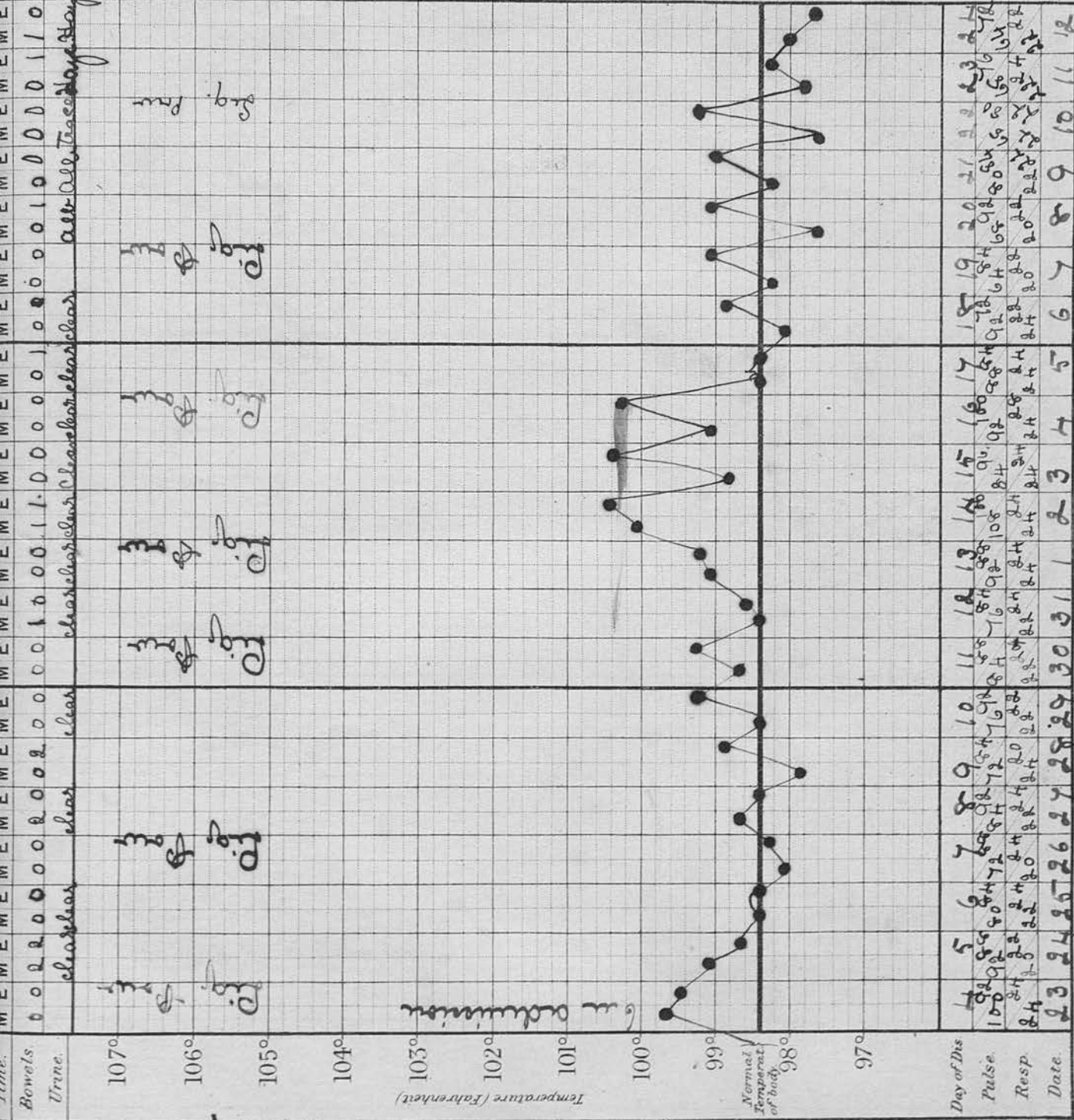
Solic. Smellie's lot

bombs - a few spots.

Date of admission.

Aug 23 rd 105

Result



Entered at Stationer's Hall.

Printed and Published by Widderspoon &amp; Co. 6, Gate Street, Lincoln's Inn.

Gould's Clinical Chart.

DISEASE.

Scarlet Fever.

Notes of Case.

Name { William  
E. Parker  
Age 14 yrs  
Diet

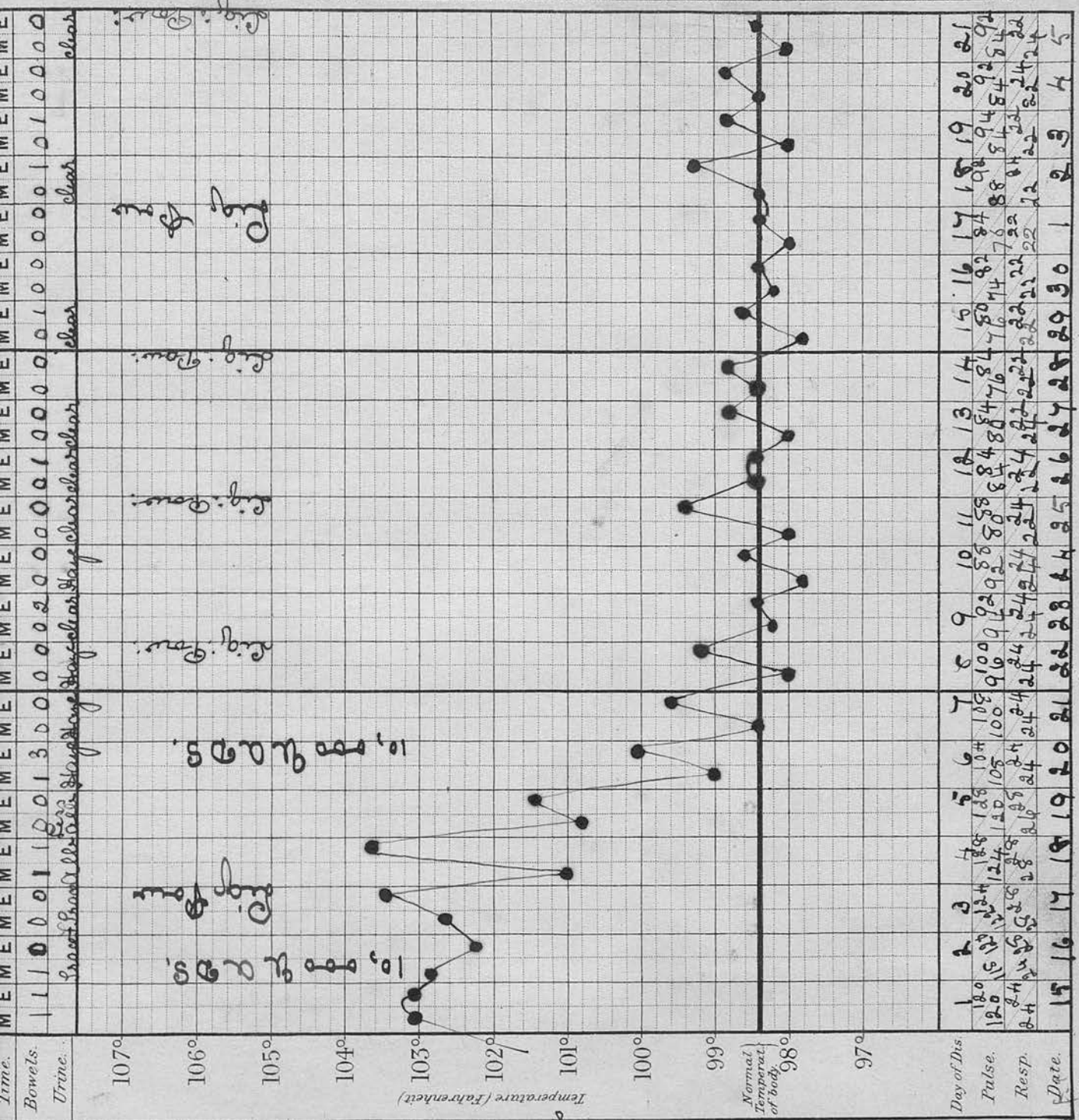
Case Book No.

15<sup>th</sup> Sept.  
Typical rash.  
Strawberry tongue  
Linsallitis (follic.)  
Headache.  
Vomited several times  
B. Ex. hepatic.

Date of admission.

Dec 23 1905.

Result Discharged





# DISEASE.

Scarlet Fever.

Hanley.

## Notes of Case.

Name { Joseph Hall

Age 4 yrs. Road

District Protestant

Case Book No.

Onset: Sept: 20<sup>th</sup> with

Headaches & sore throat

21<sup>st</sup> Rash.

21<sup>st</sup> Dr. Mason.

P. S. Prosser & W. Lough

in infirmary.

6 more children

in house.

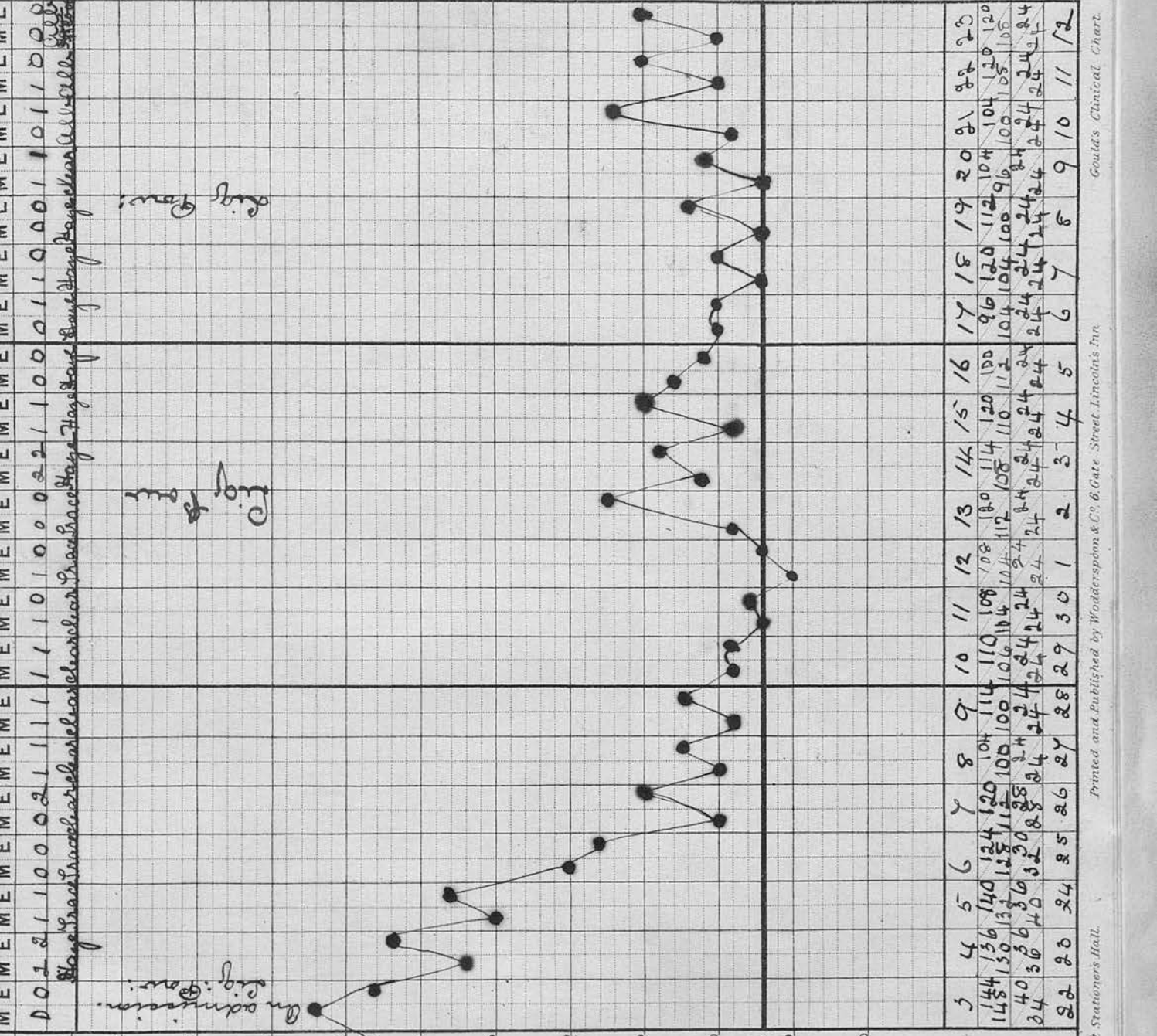
Will marked rash.

Langue purplish at base.

Cleft-palate - tumors.

Thrush clean.

Time. Bowels. Urine. Temp. (Fahrenheit). Normal Temp. of body.



Date of admission.

Sept: 21<sup>st</sup>/05.

Result

Entered at Stationer's Hall.

Printed and Published by Widderspoon & Co. 6 Gate Street, Lincoln's Inn.

Gould's Clinical Chart.



# DISEASE.

## Notes of Case.

Name { Joseph Hall  
Age 4 years  
Diet

Case Book No.

Bowels.

Urine.

Date of admission.

Sept. 22<sup>nd</sup> / 05

Result Discharged

Dec 5<sup>th</sup> / 05

Temperature (Fahrenheit)

Normal Temperature of body

Day of Dis.

Pulse.

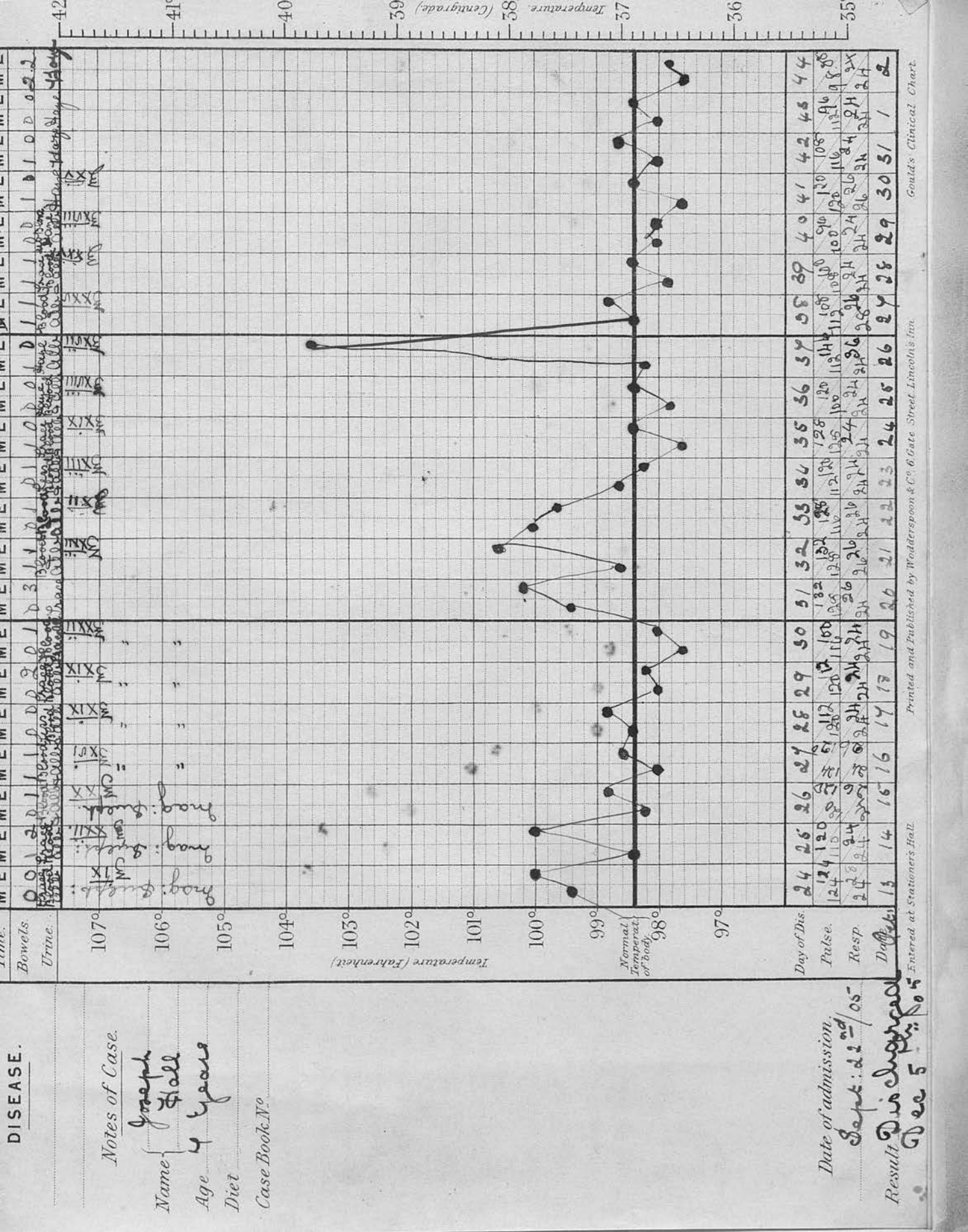
Resp.

Diap.

Entered at Stationer's Hall.

Printed and Published by Widderspoon & Co. 6 Gate Street, Lincoln's Inn.

Gould's Clinical Chart.



# DISEASE.

Spearlet. Fever.  
Honey-suckle. Sticks.  
Notes of Case.

Thomas Averill  
Name 3 Garden Row  
Age 2 years  
Diet Protestant.

Case Book No.  
Onset: Oct. 29<sup>th</sup> with  
vomiting & rash.  
30<sup>th</sup> Dr. Southwell.  
C. P. 12 months and  
subject to Bronchitis  
1 Baldy in horse  
Father in: Southwell  
Hospital.

Fading rash.  
Tongue clean.  
Throat red.  
Impetigo spots face  
& L. knee.

Date of admission.  
Nov. 1<sup>st</sup> 1905

Result

